



Consolidating our success

We recently held our TUSAIL Final Symposium which was very much integrated into the key themes of the *11th International Conference on Conveying and Handling of Particulate Solids (CHoPS 2024)*. The conference took place at the Edinburgh International Conference Centre from 2nd to 4th September 2024. All ESRs had the opportunity to present their research outcomes. The event presented a unique forum to promote the exchange of technical and scientific information across the academic and industrial sectors in the multidisciplinary field of handling and processing of particulate solids. There was significant international participation with delegates from around the world, thus providing an excellent research dissemination and networking opportunities for all the TUSAIL ESRs.

Following the CHoPS Conference, we hosted a joint workshop with the [ON-DEM community \(COST Action\)](#) to explore common themes of benchmarking for DEM, contact models, and effective dissemination and outreach.

Many of our ESRs are coming to the end of their MSCA employment contracts. Some have already secured positions in industry and will continue on their doctoral studies part-time. Whatever their paths, we will continue to support them on their career journeys and wish all of them well in their future endeavours. We have four months to go before the closure of TUSAIL. Our last in-person meeting gave us an excellent opportunity to reflect on maximising the project's impact and continuing to disseminate our results beyond 2025.

Prof. Jin Ooi, Project Coordinator

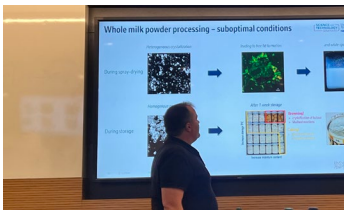
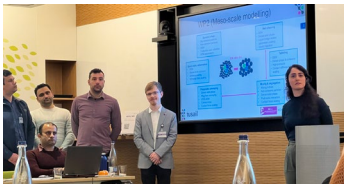


6th Doctoral School

NESTLE – 2024 @Lausanne

The 6th and final doctoral school hosted by Nestlé Research kicked off at Lausanne on 12th March. The first day of the school saw the ESRs pitch their work by presenting their posters to the TUSAIL industrial and academic partners along with scientists/researchers working at Nestlé Research. Presented across three sessions spread throughout the day, interactions included valuable feedback on individual posters as well as interesting exchanges of ideas. Each poster session included a group discussion for the ESRs to identify project overlaps and explore possible collaborations.

The morning session on the second day was dedicated to the annual reviews of the ESRs with their supervisory team along with external experts. This served as a good opportunity for reviewing the annual performance and receiving feedback for possible course correction. The afternoon session included engrossing talks by [Dr. Luis Martin De Juan](#) and [Prof. Vivek Ranade](#) followed by an interactive session between the ESRs & Prof. Ranade to discuss the challenges and opportunities in academia and industry. The day concluded after the supervisory board meeting.



The third day of the school was organized as the “Career day” by Nestlé Research for the ESRs. The day started with an introduction about Nestlé by Ryan Carvalho which included the broad overview of the various verticals of Nestlé and the work carried out by Nestlé Research. This was followed with talks by Christoph Hartmann and Morgan Seisson. The ESRs were introduced to Nestlé’s Accelerator programme by Loriane Sutter which included a visit of the facility and an interactive session about the programme’s operation & objectives. The afternoon session saw ESRs receive CV and interview preparation training by Marina Girardi followed by a session by Christoph Hartmann for apprising the ESRs about the various career opportunities available at Nestlé.

The final day of the school saw interactive talks being given by Nestlé’s executives on topics related to food technology and process modelling and optimization. The school concluded with a session by [Charlotte Mader](#) which helped ESRs write impactful cover letters and selecting a career path which aligns with their inner values.

Our ESRs

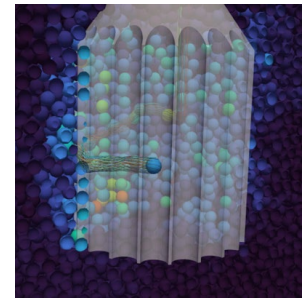
Are you interested in the DEM calibration procedure for dry non-cohesive and dry cohesive powders?

Have you ever wondered how to calibrate DEM parameters in different devices? Then you should meet our ESR Saeed Mahdavy from Iran.

He obtained his BSc and MSc in chemical engineering from Amirkabir University of Technology (Tehran Polytechnic), where he focused on non-spherical particle motion in rotary drum and the pyrolysis process of wood inside a rotary reactor.

Saeed has started his EngD at the University of Twente, the Netherlands. He is currently performing rheological tests on cohesive powders at the Powder Technology lab at the University of Salerno, Italy.

Saeed characterizes the bulk properties of powder by using the Anton Paar Powder Rheometer and Schulze Ring Shear Tester. His main focus is to design a protocol for the calibration and validation of the dry cohesive and dry non-cohesive powders in different devices.



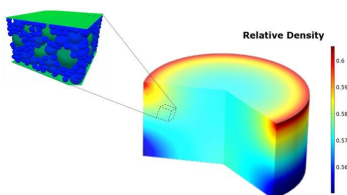
Are you interested in sintering?



Then you should get to know our ESR Afshin Taghizade from Iran. He completed his MSc in chemical engineering at the Iran University of Science and Technology. In his Master's thesis, he experimentally and numerically (CFD) investigated waste tire pyrolysis in a rotating drum. He has over 3 years of working experience as a process engineer in different industries, including the oil, gas, and food sectors.

Within TUSAIL, Afshin is working on multi-scale modelling of particle agglomeration through sintering. This model can be used to predict complex phenomena through solid-state sintering, including shrinkage and microstructural evolution. This is crucial to the dimensional accuracy and properties of the sintered product.

He has been working at the University of Edinburgh and at his industrial partner Johnson Matthey (UK). Additionally, he completed a two-month secondment in Altair EDEM and Johnson Matthey Characterisation team.

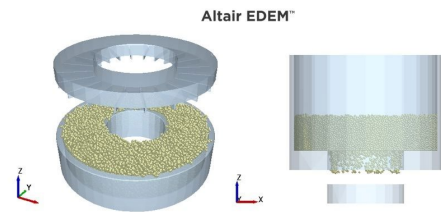


Our ESRs

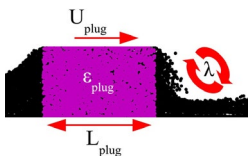
Are you interested in the flow of cohesive powders?

Then you should meet our ESR Rahul Sharma from India. Rahul is a mechanical engineer who obtained his master's degree in Thermal Engineering from TIET Patiala, India, where he worked on improving flowability of fine cohesive powders by blending and dry coating.

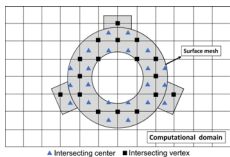
Within the TUSAIL ITN, Rahul is working on characterizing the flowability of weakly compacted cohesive powders as often their inadequate flowability impedes the smooth functioning of the bulk solid handling industries. Along with the experimental campaign, he's working on developing a coarse-grained DEM model to provide new insights into the microscopic phenomena during flow. Rahul's project is a collaborative project between Università degli Studi di Salerno, Italy, and The University of Edinburgh, UK. He began his project in Italy and is now living in Scotland. Rahul completed his secondment with Johnson Matthey and is currently undergoing his secondment at Altair EDEM.



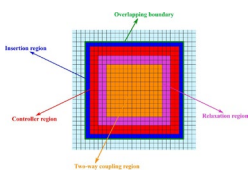
Highlighted Publications



Erken, O, Ooi, J.Y., Gupta, P., Capozzi, L. & Hanley, K. (2024) Parameters affecting plug characteristics in dense phase pneumatic conveying of ellipsoidal particles, *Powder Technology* 437, 120094 [10.1016/j.powtec.2024.119561](https://doi.org/10.1016/j.powtec.2024.119561)



Tanneru, Y.S., Finke, J.H., Schilde, C., Harshe, Y.M. & Kwade, A. (2024) Coupled CFD-DEM simulation of pin-type wet stirred media mills using immersed boundary approach and hydrodynamic lubrication force, *Powder Technology*, 444, 120060 [10.1016/j.powtec.2024.120060](https://doi.org/10.1016/j.powtec.2024.120060)



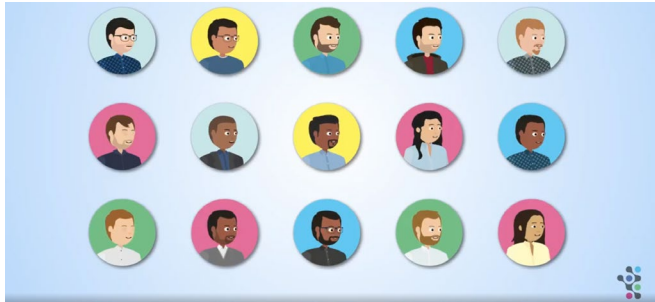
Esgandari, B., Queteschiner, D., Pirker, S. & Schneiderbauer, S. (2024), Discrete magnification lens model: A new hybrid multi-scale modelling method for fluid-particle systems, *Powder Technology*, 445, 120094 [10.1016/j.powtec.2024.120094](https://doi.org/10.1016/j.powtec.2024.120094)

Outreach

TUSAIL Promo Videos



Link: [Meet TUSAIL's ESRs](#)



Link: [Animated TUSAIL](#)

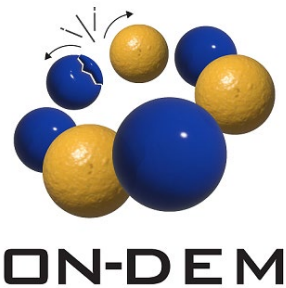
To provide a simple introduction to us, what we do and the benefits of being part of a MSCA ITN, we commissioned a video production company to record ESRs talking about just those things. Over 1 hour of video was edited into 1m 54s. It was very challenging to make sure that all ESRs were represented and that we were able to communicate our aims in a clear and concise way!

To share TUSAIL's aims and objectives beyond the scientific community, we also commissioned an animated video from [SCI-ANI](#). This brief video is a visual demonstration of TUSAIL's aims and objectives. Through a series of animations and accompanying voiceover, it explains just how the project aims to help optimise everyone's experience of using granular matter in everyday chores and activities.

Collaborating with other EU programmes

Joint workshop with [ON-DEM COST Action](#)

Discrete Element Method (DEM) simulations are used across multiple disciplines and as a result, the techniques have developed in different ways and many DEM software packages exist. Even for experienced researchers the choice of a DEM code is challenging and involves a steep learning curve. However, open-source programs are free, well adapted to research, and promote knowledge sharing, reproducibility, and versatility. They also prevent the "black box" problems encountered with proprietary/commercial platforms.



Led by [Dr Daniel Barreto](#) of Edinburgh Napier University, ON-DEM aims to unify knowledge and people across wide/diverse DEM communities. They will assess and extend what can be achieved with DEM by disseminating new developments, promoting best practice, providing simulation examples, validation experiments, common tools for data analysis, as well as training of young researchers and involving other interested parties.

DEM is fundamental to a number of TUSAIL projects with many of our scientists engaged in both TUSAIL and ON-DEM activities. We held a joint workshop on 5th September 2024 to explore common themes of benchmarking for DEM, contact models, and effective dissemination and outreach.

TUSAIL at the finish line

Final TUSAIL meetup – 2024 @Edinburgh



The 11th International Conference on Conveying and Handling of Particulate Solids (CHOPS) took place from 2nd–4th September at the Edinburgh International Conference Centre. Bringing together leaders from industry and academia as well as fostering new talent, there were over 190 talks covering a wide range of particle-related topics from Handling & Storage to AI and Sustainability. Jin Ooi opened the conference and drew particular attention to TUSAIL. ESR talks were integrated throughout to ensure the effective dissemination of our achievements to date as well as looking to the future and how our reliable upscaling methodologies and tools can help bridge the gap between micro-mechanics and the industrial scale.

Beyond TUSAIL: Placements and Future Plans

TUSAIL has crafted some of the best particle technology experts, ready to join the industry or pursue advanced research in academia. The comprehensive training provided has attracted partner institutions and other major players in the particle technology domain to employ TUSAIL researchers. Our ESR Afshin Taghizadeh has joined AstraZeneca as a Senior Scientist (process engineering), where he will be working on drug development, scale-up and optimization of processes. Meanwhile, Jobin Raju will join Ansys (Rocky) as a Senior Application Engineer. Varun Dongre will join DyssolTec (spin-off from TU Hamburg). Gero Stöckl joins BASF as a Research Engineer in Computational Fluid and Particle Dynamics. Additionally, the ESRs affiliated with the University of Twente will continue with their fourth year of research, further contributing to advancements in particle technology.



Afshin Taghizadeh

Sr. Scientist, AstraZeneca
(U of Edinburgh
Johnson Matthey)



Jobin Raju

Sr. Application Eng., Ansys
(TU Braunschweig,
DCS Computing)



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