



Program

May 21-22, 2019 in Steyr, Austria

The virtual validation of products during the development process is in popular demand not only in the automotive industry but also essential in all innovative manufacturing industries. Additionally, the early detection of potential problems in the painting process as well as in pre-production phases can create cost-effective solutions. The world's first conference on simulation in the field of industrial painting technology will investigate the simulation of pretreatment, electrodeposition, drying and curing processes, as well as preservation processes (e.g. wax processes) along the process chain.

Expert keynote speakers from the automotive industry and simulations experts will report on current applications and news. This conference will gather experts on the forefront of these developments to discuss existing key progress and promising new directions in industry.

In addition to keynotes and technical presentations, the ESS World Conference will also be part of the conference on the second day. ESS will present current results on their EU project SENSE (No.: 778627 - H2020) and focus on applications that can be utilized in the Paint Shop.

We would be pleased to receive your registration.

Your DFO and ESS Team

Tuesday, May 21st 2019

08:30	Reception and registration	
09:00	Welcome Dr. Martin Schifko ESS Engineering Software Steyr GmbH	
09:15	Optimizing an automotive paint shop scheduling problem, Christoph Hansal, MCP GmbH To efficiently schedule the carriers (SKID") in a paint shop a lot of factors have to be considered: hard and soft constraints (e.g. forbidden color changes, minimum number of carriers used in a round), the availability of the resources, the amount of carrier changes and color changes to run the paint shop on high speed, current demands and the sequence of the previous round as an starting point for each following round. We present an algorithm that fully considers the typical constraints and rules of a round-based paint shop and based on current demand data creates and mathematical-optimized sequence for the carriers within minutes.	14:30
		coffee break
		15:00
09:45	Paint shop simulation using a car body, Norman Knapp, Opel AG Overview about BIW simulation of air bubbles, liquid carry over, e-coating and baking.	15:30
10:15	coffee break	
10:45	Key factors for a successful e-coating simulation, Dr. Hui Cao, Dr. Ernesto Monaco ESS Engineering Software Steyr GmbH Both a classic model based on the electric potential distribution and the Faraday's law and a new hydrodynamic model based on the Nernst-Planck equation will be discussed in this talk. For the classic model, the parameter identification issue from lab-experiments are considered. The hydrodynamic model can cover the influence of paint velocity in the thickness simulation. The technique of the detection of air bubbles is applied to improve the precision of the thickness simulation.	16:00
11:15	Cost savings in car production and development, Dr. Stefan Hildenbrand, Pfinder KG The simulation of the application of cavity waxes has been developed by Pfinder in the last couple of years and been employed in different customer projects in this time. While the character of the first projects in this field has been of rather academic and demonstrative nature, the latest projects have been conducted in a productive environment with the clear objective to save cost in the production of cars. In this talk we will present the results of such a project and highlight the possibilities to lower production or development cost with the help of simulation.	
11:45	Hedging process of agricultural machines by simulation, Anand Metha, John Deere Werke The simulation of paint shop applications in agricultural industry is getting more and more important. With help of simulation software the applications are getting more stable and lots of costs can be save.	
12:15	Lunch	
13:30	CAD to Simulation in One Klick, Visha Nair M.Tech ESS Engineering Software Steyr GmbH Pre-processing data for your simulations is a critical task, but it could be very tedious, repetitive and mundane job. The complexities could vary from the Geometric complexities, Large number of parts and even bad CAD quality containing duplicates, intersections etc. MERGE solves these problems with some powerful capabilities, which includes CAD cleanup, Re-Meshing complex geometries, connecting large assemblies, and finally able to export in several popular formats. All in 1-click! Merge comes with a very user friendly GUI for basic users and a CLI for advanced users which can be used to script custom workflows	16:30
14:00	Process simulation of pre-treatment processes in high-volume car body painting, Michael Carl, Georg Fröhlich Eisenmann SE	
		In painting plants workpieces undergo various process steps. These have to meet ever higher demands in terms of cost savings, environmental compatibility and quality. Such complex systems can be modeled and simulated using suitable software. The obtained insights can help to improve plant design and contribute to a continual process optimization. In the DiWaL project, Eisenmann conducts studies on process simulation in paint pre-treatment.
		simulation applications to paint shop processes Prof. Alireza Eslamian; ESS Engineering Software Steyr GmbH This paper presents an overview on all current numerical simulation applications to paint shop processes. In addition, the upcoming applications will be summarized. Alsim paintshop has been developed by ESS (Engineering Software Steyr GmbH) to simulate Rins, Dip painting, E-coating, Oven and baking, Waxing, PVC sealing, etc. This software is customized to predict common issues that occur during dip painting be it liquid carry over, air bubbles or liquid puddles. Users are informed about drainage time and are even offered to make enhancements in order to optimize the car body already in the design phase from the perspective of painting. ESS can simulate irreversible deformations of the car body during dip painting processes, elastic deformations during baking sequences in oven which include phases like heating-up, holding or cooling down and rotary-bell spray painting for top-coating. Alsim Paint Shop helps the engineers to take body-shop and paint-shop issues into account during the design process of the car body and thus dramatically enhance the overall quality of corrosion protection.
		Spray Pretreatment and Rain simulation on BIWs; Dr. Durga Prasad; ESS Engineering Software Steyr GmbH The presentation is divided into two parts. Part 1 discusses the Capabilities of ALSIM Paint Shop module in modelling the Spray Pretreatment process which is an important step in the Paint shop process of automotive industry. To increase the effectiveness of the finish, parts must be clean prior to coating. Aqueous cleaning, vapor degreasing or ultrasonic cleaning are typical cleaning processes, and of the three, aqueous cleaning makes up the majority. With ALSIM Paint Shop, it is possible to pre determine the areas, which are not treated well, areas which are not accessible to the aqueous solution. The presence of these area will affect the quality of later stages of paint shop process. Part 2 discusses the ALSIM Paint Shop capabilities in modeling the Rain scenario. Heavy rain on car bodies may lead to puddles causing corrosion or malfunction of electric components. Real-life rain tests" in tightness chambers are extremely costly. With ALSIM Paint Shop, designers and engineers can reveal the problems of

	rain at an early stage in the design process and take appropriate measures to mitigate the risk of water-induced damage and failure.		manufactured parts to ensure high degree of cleanliness. The current simulation approach involves a meshless Lagrangian-based particle method known as Smoothed Particle Hydrodynamics, highly capable of representing accurate fluid dynamics of free-flowing surfaces and large deformation scenarios. Observation of physical properties in the cleaning process from such simulations will be used to optimize the processes.
18:30	Dinner		
	Wednesday, May 22th 2019		
09:00	Improve thermal management, stress and deformation for BIWs in the oven by simulation, Dr. Ernesto Monaco, ESS Engineering Software Steyr GmbH An accurate modeling of heat transfer in car-baking process is fundamental to optimize the performance of existing ovens as well as to design new ones. Numerical simulations can greatly help, provided they are able to effectively capture the effect of heat convection and radiation on the surface of car body and inside it. In this talk we present a GPU-based combination of Lattice Boltzmann and Finite Difference methods (LBM-FDM). The two methods are coupled at the fluid-solid interface and operate at different resolutions. This multiscale simulation provides accurate results at an optimistic computational cost.	13:30	The multi-phase fluid-flow modeling incl. surface tension Dr. Kamil Szewc, Integrable Multi-phase fluid-flow modeling is one of the most challenging problems in engineering, especially when the surface tension phenomena play a role. This is where classical (Eulerian, mesh-based) methods commonly fail. The main goal of the presentation is to analyze the usefulness of the Lagrangian, SPH-based framework (SENSE solver) for solving such complex problems.
09:30	Analyzing Multiphase Spray Wax Application in Paint Shop Using Coupled LBM-SPH Approach, Dr. Saurabh Bhardwaj, ESS Engineering Software Steyr GmbH One of the challenging tasks in any automotive industry is to provide efficient corrosion protection of BIW specially chassis. This involves the application of wax layers on sprayable parts of the BIW in paint shop. To achieve this task, several nozzles are provided to spray wax onto the targeted part of the BIW. Such multiphase process can be easily modelled computationally by coupling Lattice Boltzmann Method (LBM) and Smoothed Particle Hydrodynamics (SPH). LBM is used to simulate airflow and simultaneously spray of wax particles from nozzles can be modeled using SPH model. In this way, one can achieve high level of flexibility and outstanding multiphase spray wax results in a less time.	14:00	State of the Art Gearbox Simulation, Dr. Menon Muraleekrishnan, ESS Engineering Software Steyr GmbH Determination of power losses in an automotive drivetrain system has been a challenging problem in the industry for several decades. As the industry is shifting gears towards innovative drivetrain systems, the usage of computational models to provide faster solutions is growing in parallel. In providing reliable computational solutions, the use of meshless Lagrangian-based models has multi-fold advantages over traditional grid-based techniques, especially for problems involving free-surface flows and high degree of deformation. The current presentation discusses state-of-the-art in simulating meshed gear pairs using purely meshless methods, specifically focusing on the Weakly Compressible implementation of the Smoothed Particle Hydrodynamics (SPH) technique.
10:00	Cavity preservation by example of a VW Golf GTI, Dr. Martin Schifko, ESS Engineering Software Steyr GmbH The body moves onto a flood frame. Nozzles fill cavities with hot wax. After filling, the body leaves the carriage and the wax runs off. Is the required thickness given, is there overcoating, can the remaining wax drain off in time?	14:30	coffee break
10:30	coffee break	15:30	The Toolbox specialized for the most complex applications, Dr. Chong Peng, ESS Engineering Software Steyr GmbH Many realistic problems in industries involve complex fluid-solid-granular material interactions. The interactions between fluids and deformable structures, the large deformation and cracking of solids, and the interactions among fluids, solids, and granular materials are difficult to solve even for the most advanced numerical methods in the market. This is largely due to the difficulties in mesh generation, re-meshing, and tracking of free-surface and moving interface in grid-based methods. Sense is a software package purely built with meshless Lagrangian particle-based methods, i.e. SPH, DEM, and LBM. With the dedicated coupling between these methods, the difficulties in mesh-based methods can be handled straightforwardly. The package is accelerated using multi-GPU technology to achieve efficient simulations of real-life applications. The sense toolbox can be applied to some of the most complex applications in industries, providing accurate results within a reasonable time.
11:00	Simulation of air bubbles, drainage and oven, Paresh Senapaty, Volkswagen AG Reliable simulation software with quick turnaround times are the once everyone is looking for. In this presentation we will discuss venting, draiange and baking simulation of an entire car body.		
11:30	Measurement possibilities and advantages of time-shift technology, Dr. Meiko Hecker, AOM-Systems GmbH Based on the SpraySpy technology, single drop events can be characterized with spatial resolution. The drop size and drop velocity are measured in a predefined measuring volume. In contrast to other measurement technologies, which usually integrate over a larger area, this offers a much more accurate database. This allows the user to better define the input parameters of the simulation. The presentation brings the SpraySpy measurement technology closer to the interested audience.	16:00	Modelling of metal forming, casting and cutting processes, Dr. Rushdi Ibne Islam, ESS Engineering Software Steyr GmbH Numerical simulation of processes involving large material deformation and separation such as metal forming, cutting and casting is a challenging task for conventional grid-based methods. However, the particle-based methods e.g. Smoothed Particle Hydrodynamics (SPH) can model finite plastic deformation and material separation without much difficulty. In this work, a few metal processing methods such as forging, casting, pressing and cutting is simulated with the SPH framework and compared with the numerical results available in the literature.
12:00	Lunch		
13:00	Optimization of industrial washing facilities by using simulation and metrology, Gerhard Fuchs, BMW AG Identification of design constraints and process improvements will be obtained from advanced Computational Fluid Dynamic (CFD) simulations of	16:30	End of event

Information for Conference Participants:

Conference Language: English

Conference Location:

Bildungszentrum Dominikanerhaus
Grünmarkt 1, 4400 Steyr
Österreich

Conference Hotel:

LANDHOTEL MADER
Stadtplatz 36
4400 Steyr

Tel.: +43/7252/53358
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Hotel rooms are reserved for guests until April 15, 2019 under the name DFO/ESS.
Conference price is 89,- €/night incl. breakfast.

Registration:

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Participation fee/scope of services:

Non-members:

Two-day Conference Participation 1.150,- €
May 21, 2019 Participation 850,- €
May 22, 2019 Participation 450,-€

DFO Members:

Two-day Conference Participation 975,- €
May 21, 2019 Participation 675,- €
May 22, 2019 Participation 350,- €

Included:

- the lecture event
- the list of participants and contact information
- a conference transcript with all lectures
- lunch and beverages during breaks
- dinner

Honorary members, speakers, discussion leaders and representatives of the press are exempt from the participation fee.

Cancellation:

Cancellations must be made in writing and are possible free of charge until April 18, 2019.

Cancellations made through May 3, 2019 are subject to a cancellation fee of 50%. After that the full conference fee has to be paid. It is possible to transfer the registration to another person. Cancellation is only valid if corresponding evidence (e.g. confirmation of transmission) has been submitted and confirmed in writing by the DFO. The organizers can change or cancel conferences. In this case, the full fee will be refunded.

Information on the DSGVO:

Your data will be stored electronically in accordance with the DSGVO for the purpose of processing the event. We will continue to use your data to inform you about events organized by our company until further notice. You can revoke your consent to this at any time by sending us an email. The data protection declaration listed on the website www.dfo.info applies. We do not pass on your addresses to third parties for advertising purposes.

For all events, lists of participants (name, first name, company) are compiled, which are distributed to the participants present at the event. The participant lists are also passed on to our lecturers for the purpose of preparation. If you are a participant of the event and do not want your name published on this list, please inform ESS or the DFO up to two weeks before the event.

Photos will be taken at our events. These photos may also show participants.

The photos will be used exclusively for reporting on the events, for subsequent online viewing for participants of the event as well as in the context of advertising your own events. It can be used in printed or digital form (e.g. conference reports/articles in magazines, online or in newsletters).

By participating in the event, you grant us the right to use the photographs free of license fees, without time or space restrictions and to the extent specified above. If you do not agree to this, you can object to the use of the photos by making a written note of this to the organization management at the beginning of the event.