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Introduction to fiber reinforced plastics and thermoplastic composites

MARCH 7, 2022, PARIS

The intention of this seminar session is to assist professionals to discover the thriving field of thermoplastic composites, their specific technical attributes and associated processes and application areas.

BACKGROUND

Reinforcing polymers with fillers has been considered from the early days of polymer engineering, and has led to the emergence of a wide variety of fiber-reinforced materials. By far the most significant category, in terms of industrial relevance and production volumes, are plastics reinforced with “short” fibers in the microscopic range. Yet, recently, a new category has emerged that extends the span of reinforcing fibers into the macroscopic scale: so-called thermoplastic composites.

The term composite historically refers to a combination of a thermosetting matrix, for instance an epoxy, with a continuous fiber reinforcement, oftentimes a woven fabric. These materials, even though they offer outstanding performance, are also associated with tedious processing, relatively low productivity, high manufacturing cost, health and safety concerns and lack of recyclability. A recent addition to the toolbox of fiber-reinforced materials, however, addresses those key challenges by reverting to conventional thermoplastics as the matrix materials. Thermoplastic composites are indeed capable of offering the best of both worlds: the highest possible level of reinforcement due to the use of endless fibers, along with the short cycle-time processing, inherent recyclability and hybridization potential offered by a thermoplastic matrix. This allows them to compete with incumbents such as metals, and their combination with other types of reinforced plastics results in lighter, better performing and more durable parts. Their use is therefore expected to grow significantly over the coming years in applications from automotive over consumer goods and electronics to oil and gas and aviation.

Yet, these new materials come in a wide variety of product forms and with an even higher range of associated processing methods. Furthermore, they lend themselves to combinations with other types of fiber reinforced

SCOPE

plastics. This versatility leaves the engineer with a vast spectrum of materials and design options; it is the purpose of this seminar to reduce that inherent complexity by providing participants with both the theoretical background and highly practical guidelines as to how thermoplastic composites as well as the broader family of reinforced plastics behave, can be used, and should be combined for performance and cost-effectiveness.

This seminar will build on the principles of classical fiber reinforcement theory - highlighting the key roles of fiber type, length and interfacial interaction - to introduce thermoplastic composites as a new class of materials with remarkable performance. It will address the various semi-finished product forms available on the market, will emphasize the influence of reinforcement architecture on the material properties, and will introduce the design, processing and recycling possibilities brought along by this class of materials.
A strong focus will be put on the hybridization possibilities between thermoplastic composites and more conventional reinforced plastics, such as the overmolding of composite inserts with short fiber compounds, thus offering insights into options for a cost-effective use of these materials. The introduced principles will be supported by application examples and use cases across industries.

Target audience:
This course is intended for a wide audience of technicians, engineers, scientists and managers eager to discover the thriving field of thermoplastic composites within the broader context of fiber-reinforced plastics. Participants will discover the specific technical attributes of this relatively new class of materials and their associated processes and application areas.

Dr. Vito LEO

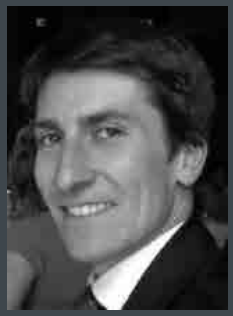
More than 30 years experiences in

polymer processing and physics process.

Dr. Hans E. Miltner

Close to 20 years of combined academic and industrial

technical experience in the plastics sector



LECTURERS

Vito Leo is a physicist by training (PhD from Brussels University), and has been working for more than 37 years in the field of polymer processing and mechanical performance of thermoplastics. He has been very active in the field of Injection Molding of Thermoplastics and the use of Finite Element Numerical Simulation of this process, initiating and managing a CAE Team in a large company. He worked for the largest chemical company in Belgium in a number of research projects in the field of Rheology, Injection Molding, Mechanical performance of polymers and 3D Printing. For nearly 20 years he was Professor at Université Libre de Bruxelles, where he taught an introductory course in Polymer Processing to students of the Engineering Faculty nearly identical in content to his well-known seminar BIMS-1. He is now full-time on the BIMS SEMINARS activities, expanding the training portfolio and starting consulting work in addition.

Hans Miltner holds a degree in chemical engineering and obtained a doctorate in the field of polymer science from the Free University of Brussels. He started his career in academia, conducting applied research in the area of polymer nanocomposites. He then moved to industry where he led developments in functional coatings, specialty polymer compounds and thermoplastic composites. After taking on more commercial and business management roles, overseeing a number of global market segments such as automotive and oil & gas, he founded an independent technology consultancy and business development firm. Today he supports material suppliers, technology providers and end-users across the global plastics and composites industry, facilitating the market introduction and accelerating the adoption of plastics innovations. He brings along close to 20 years of combined academic and industrial technical experience in the plastics sector.

The seminar will start by shedding light on how fibers reinforce plastics in general, before introducing continuous fiber reinforced plastics and elaborating on their relative performance vs. other materials. It will then provide an overview of the different product forms available, on their associated processing solutions, and on the applicative benefits they provide in their typical end-markets.

CONTENT

Along the training, participants will be taught the specific mechanisms that govern material performance, and will be given highly practical guidelines for material selection, hybridization and part design principles. After attending the seminar, participants will hold the keys to developing high-performance, lightweight and cost-effective components, building on a good understanding of:

__ Why do fibers reinforce plastics, and what are the reinforcing mechanisms?
__ What is the dependence on fiber length, and how critical is interfacial interaction?
__ Under which product forms are continuous fiber thermoplastic composites available; what are their general strengths and weaknesses?
__ Which factors drive material selection, that is:
    _ what is the role of the matrix polymer (crystalline/amorphous, high/low-Tg)?
    _ how does the reinforcement affect performance (glass/carbon/other, unidirectional/woven)?
    _ what are effects of fiber orientation, ply stacking and anisotropy?

__ How are properties dependent on temperature, load orientation, time or cyclic loads; with this in mind, what are general design principles for thermoplastic composite parts?
__ What are the available processing methods for the various semi-finished product forms available today (tape laying, filament winding, stamping, overmolding); how does this influence productivity, cycle time, performance and cost?
__ How can thermoplastic composites be combined with conventional materials; what approaches are there to using them for local part reinforcement with conventional processing technology?
__ What are typical applications and specific applicative benefits of thermoplastic composites and hybrid parts?
__ How are the adoption level and market maturity for thermoplastic composites technology; how are they forecast to develop?

AGENDA

10:00	Self-introduction of speakers and goal of the day	
10:15	Scope, definitions and market context	**Hans E. Miltner**
11:00	**Coffee break, discussions, samples**	
11:20	Why filled systems?	**Vito Leo**
12:00	**Lunch break**	
12:45	Overview of thermoplastic composite product forms	**Hans E. Miltner**
13:30	Why continuous Fibers?	**Vito Leo**
14:00	Production of thermoplastic composites	**Hans E. Miltner**
14:40	**Coffee break, discussions, samples**	
15:00	Why thermoplastics?	**Vito Leo**
15:30	Engineering and processing of thermoplastic composites	**Hans E. Miltner**
16:30	**Coffee break, discussions, samples**	
16:50	Application examples, conclusions and Q&A	**Hans E. Miltner**
17:30	**End of the day - Feedback**	

Are you interested?
Use the opportunity to better understand engineering and processing of thermoplastic composites and register now.

Register via
www.simpatec.com

REGISTRATION

Registration:
__ visit the category ‘Events’ at www.simpatec.com and sort the events by type (seminars),
__ choose the seminar session “Introduction to Thermoplastic Composites” and
__ fill out the given registration form.

Registration fee for this seminar:
EUR 950.00 (+ 19% VAT)
The fee includes the lessons, training material, food and beverages during the day. We appreciate to provide a special **early bird price** of EUR 790.00 (+ 19% VAT) for all registrations **before January 31, 2022**.

Remark:
The seminar will take place with a min. of 10 participants. In case of any regional restrictions or limitations related to Covid-19, we reserve the right to convert the face-to-face seminar into a digital event.

Cancellation:
Cancellations received 30 days or more before the seminar are fully refunded.
For cancellations received less than 30 days but more than 14 days before the seminar, 70 % of the fee payment will be invoiced. No refund for cancellations received later than the 14 days.

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