Victor Francia

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Chemical Engineer

EngD Research Engineer
Sponsors: EPSRC and Procter & Gamble

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Born in Zamora, Spain. Victor obtained a superior Chemical Engineering degree in 2006 at the University of Salamanca, Spain. To date he holds several postgraduate Master degrees on the field of engineering within international development & humanitarian relief projects as well as international politics & crisis management, along with other related qualifications on governmental [War College of National Army. Spain] or international humanitarian agencies [International Committee of the Red Cross ICRC. CHYN University of Neuchatel. Switzerland].

Since his graduation, Victor has worked in industry as an engineer for several years, at research roles for R&D at Procter & Gamble, and within management positions on international water infrastructure projects at ACCIONA Agua. Recently he joined academic research taking part of the EngD programme at the University of Birmingham. He currently works under the sponsorship of Procter & Gamble and EPSRC on particle agglomeration within counter-current spray drying processes. Victor is supervised by Dr Mark Simmons, and Dr Luis Martin de Juan and Mr Mark Ridyard, from the University of Birmingham and Procter and Gamble, respectively, and he is expected to submit his doctoral thesis by October 2013.

EngD Project Background

Particle agglomeration within counter-current spray drying systems impacts a wide range of product properties by poorly understood interaction mechanisms. Being of vital importance for process operation, there is still a significant lack of knowledge regarding the control of particle growth patterns. As a result, manufacturing units currently lack from robust engineering tools capable to fully design, control and describe the agglomeration process, which leads to a number of operational drawbacks.

EngD Project Aims

The objectives of his work comprise:

Gathering a fundamental understanding of the mechanisms leading to these phenomena in the context of counter-current spray drying of detergent formulations.

Generating suitable modelling tools to optimise particle growth patterns.

The main outcomes for manufacturers' will come from production capacity increases, energy efficiency optimisation and a better control strategy for product properties.

Current work

Initial experimental results prove the existence of competing growth and breakage mechanisms and highlight the generation of specific agglomerate structural properties.

Growth patterns comply with a theoretical analysis of particle collision frequency and efficiency based on available literature and modelling tools for similar systems.

Air flow field data have been gathered by "in situ" velocity measurements, revealing good agreement to previously reported data for counter-current spray drying towers.

Further experimental work is currently being conducted isolating the impact on growth of each potential inter-particle interaction. This will allow determination of the most successful growth mechanisms and then, restrict the number of variables to be taken into the modelling stage.