IbD - Case Study 2 Process Intensification applied at Ceramic Powder

Project:
Intensified by Design® for the intensification of processes involving solids handling

The IbD Project has delivered the EU process industry with an affordable and comprehensive devices-and-processes design-platform endeavoured to facilitate process intensification (PI), which specially targets -but is not limited to- solid materials processing. Five PI industry case studies have been implemented in mining, ceramics, pharmaceutical, non-ferrous metals and chemical processes using the IbD approach and to validate the IbD methodologies, tools, PI modules, control and fouling remediation strategies and the ICT Platform itself for the industrial implementation of PI in processes involving solids. The Platform includes design modules for the commonest intensified reactors-Rotating fluidized beds, micro-structured reactor and spinning disk, among others, as well as a generic Module Builder -equipped with a set of both proprietary and third-parties design tools- for designs carried out on the basis of radically novel ideas. The IbD Platform output is basically a data set that comprises the intensified reactor design -ready to be built or assembled-, an optimised whole process design including the upstream/downstream intensified unit operations and their solids handling capability, as well as cleaning methods, etc. and the expected economic and environmental quantitative impacts.

Project website: http://ibd-project.eu/ This project has received funding from the European Union's Horizon 2020 research and Innovation programme under grant agreement No **680565**

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Sector:

Ceramics

Summary:

This case study has been focused on the intensification of the free-flowing powder preparation process involved in the very beginning of the ceramic tile manufacturing process. Nowadays, the most widely used ceramic tile shaping method is uniaxial pressing of spray-dried powder in hydraulic presses .The base case involves a wet route procedure where the initial free-flowing powder is obtained from a high solid content slurry, which itself produced by wet grinding of a mix of

different solid raw materials with water and additive in continuous or discontinuous mills.

Theme:
Process Intensification - SPIRE05-2015
Keywords:
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IbD Project

Brief description of PI technology chosen:

Two process intensification technologies have been chosen and proved during the development of the project: high-shear granulation and rolling compaction. Both technologies have been used to process dry powders provided by a pendulum mill. In both proposed dry routes, the pendulum mill would define the particle size distribution of the primary powder particles. By processing these primary powders, the process intensification technologies have been tested, adapted and optimised to obtain free-flowing powders with the best possible physical properties. The free-flowing powder physical properties considered during the technologies optimization have been the granule size distribution, the moisture content, the shape and strength of the granules and the flowability of the powder.

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