SPIRE-08-2015 - Solids handling for intensified process technology

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Specific challenge: Decentralised on-site plants and modular approaches towards small- and medium-scale production will play a significant role in tomorrow’s process industry. However, the use of highly intensified, miniaturized equipment is largely restricted to gas/liquid and liquid/liquid systems, while most processes applied in the chemical and pharmaceutical industry, as well as industries processing steel, glass, cement, non-ferrous metals, or minerals, involve solids as reactants, catalysts, intermediates or (by-)products. If these processes are to be transferred to intensified process equipment, it is likely that difficulties associated with the presence of particulate solids will be encountered, such as fouling or blockages. Robust and sustainable solutions to these problems are hardly available. This hampers the industrial realization of processes involving solids handling.

A further challenge of increasing importance for these industries comes from the increasingly demanding customer expectations with regard to product properties. These specific needs have to be met by developing fast and flexible processes that allow for design and development of tailor-made products while keeping the time-to-market as short as possible. One possible solution is to build on continuous processes, which can significantly reduce development time as well as scale-up efforts.

Scope: Methods should be developed for the handling of solids in continuous production units. This can be achieved either by the miniaturization of currently available devices or – to a great extent – by completely new approaches to the processing of solids. Projects should apply a holistic approach towards relevant processes in which solids are an intrinsic part. Rather than the core processes for solids handling, the whole process design should be considered, in particular downstream processing operations such as catalyst recycling, solids isolation, waste treatment, or waste prevention. This can be realised by means of flexible, e.g. modular and fast process design. Such an approach would foster regionalised production. Case studies should be included on several of the following aspects:
- Metering of solids
- Advanced analytic systems
- Transport of solids
- Control of agglomeration
- Reduction of fouling
- Cleaning concepts, e.g. CIP
- Solid separation and recycling
- Regulatory requirements

For this topic, proposals should include an outline of the initial exploitation and business plans, which will be developed further in the proposal project.

Activities expected to focus on Technology Readiness Levels 5-7.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:
- Novel, efficient and cost effective production concepts realized in commercially available process intensified equipment, respectively process equipment modules.
- Innovative modules allowing to process solids in medium to small scale production units (particular emphasis should be given to the SPIRE sectors).
- Amelioration of chemical applications accessible via process intensified reaction systems through whole process design with focus on solids (downstream) processing operations.
- Shorter times to process/market and higher production capacity.
- Cross-sectorial technology transfer

Type of action: Innovation Actions