Distributed In-Situ Sensors Integrated into Raw Material and Energy Feedstock

DISIRE

Executive Summary

The European DISIRE project has been inspired by existing and emerging industrial needs, while aiming at creating a significant impact in the area of Integrated Process Control (IPC) within SPIRE. DISIRE tackles the challenges of process optimization and high energy and resource intensity in chemical, mining, steel and mineral processing industries. The project's ambition is to set new energy efficiency standards in the European process industry. Top researchers and world leading industrial players will cooperate under the DISIRE research umbrella in order to develop robust, yet miniaturized in-situ Process Analyser Technology (PAT) sensors and introduce a novel reconfigurable IPC approach to current industrial processes.
The ultimate goal of the DISIRE technological platform is to establish a seamless integration of multiple DISIRE enabled PAT sensors into raw material flows to analyze and transmit big volumes of process data and on-line optimize the existing control loops for achieving better product quality, lower energy consumption and improved industrial reconfiguration and adaptability in the production processes. Based on the DISIRE scientific and technological contributions, multiple new opportunities for commercial applications and cross-sectorial business cases will emerge.

Relation to SPIRE

The majority of the DISIRE consortium partners are existing members of SPIRE – an international non-profit association formed to represent the private sector via the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) Public-Private Partnership (PPP) launched as part of the Horizon2020 framework program.

SPIRE
Sustainable Process Industry through Resource and Energy Efficiency

Horizon 2020
European Union Funding for Research & Innovation

DISIRE Technological Platform

DISIRE aims to develop and introduce a technological platform for novel inline measurement techniques and PAT based IPC approach. The DISIRE platform will evolve the existing control and monitoring systems from a static sensing and control in multiple parallel loops perspective into a product based, online, and in-situ process reconfiguration of IPC strategies based on PAT analytics of a vast stream of data from the internal process dynamics.

The **key features of the DISIRE technological platform** in a nutshell:

- Scalability, robustness and adaptability to the industrial processes and to the characteristics of the current raw materials or products.
- Reconfigurable and platform independent IPC approaches featuring the new concept of online PAT analysis, which allows for an optimal selection of current set points for processes.
- Inline disposable sensors with the extended novel sensory capabilities that, when inserted in the material flow, will be transformed into a swarm of sensors capable of measuring in real time the processes' internal dynamics.
- Advanced reasoning and process status cognition, statistical learning, process perception and process model generation by a mixture of classical off line PAT analysis with geospatial information from the inline swarm sensors and with an overall ability to generate process analytics in near real time.

DISIRE Industrial Application

The scientific focus of the project has been specifically designed to generate both horizontal and vertical impact and to take into account a holistic approach aimed at developing new integrated control strategies and meeting the current specific needs of the raw materials or products in the process and within their production cycle.

DISIRE will influence the following processes:

- ***Non-Ferrous Processes*** – improve the transportation problem of raw materials by utilizing belt conveyors and processing of the ore in order to achieve an overall reduction of the circulation times and enhance the on line PAT information for further process stages.
- ***Ferrous Processes*** – conduct demonstrations and experiments in real industrial environments in order to establish a rugged sensor platform capable of withstanding the harsh industrial conditions of ferrous mineral processing, e.g. abrasive wear and high temperatures.
- ***Steel Processes*** – facilitate and demonstrate the use of novel sensor technology in steel plants for measuring process values such as temperature and gas composition, while investigating the capability of embedding them in the raw material flow during preparation, handling, feeding of and operating inside the blast furnace.
- ***Combustion Processes*** – develop diagnosis and monitoring techniques for on-line non-invasive measurements of variables such as velocity, temperature and gas species concentration in order to lay the foundation of a substantial increase of energy efficiency of the whole production process as well as a reduction of CO2 emissions.
- ***Cross-Sectorial Application*** - develop the DISIRE technological platform and its components with a generalized architecture, which can be adapted to processes outside the scope of the project and meet current and future market requirements.

DISIRE Innovation and Impact

The collaborative and integral innovation approach within the DISIRE project aims to transfer the generated knowledge to the partners, to the European process industry community and bridge the gap between research and market. Expected impact from the DISIRE project includes placing of the consortium partners in a highly competitive position in both European and international markets, thereby creating and protecting jobs, increasing revenues and boosting further investment and technological developments.

DISIRE at a glance

Project Duration: 01/01/2015 – 31/12/2017

Project Funding: 6 million EUR

Project Consortium: 15 partners from Sweden, Spain, Italy, Germany, Poland and Israel.