



Intelligent Decision Support and Control Technologies for Continuous Manufacturing of Pharmaceuticals and Crystallisation of Fine Chemicals (ICT-CMAC)

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Research Areas



Product Development

At a Glance

- Status: **Active Consortium**
- Year Launched: **2013**
- Initiating Organization: **University of Strathclyde**
- Initiator Type: **Academia**
- Location: **Europe**

Abstract

The Intelligent Decision Support and Control Technologies for Continuous Manufacturing and Crystallisation of Pharmaceuticals and Fine Chemicals (ICT-CMAC) project is a five-year initiative funded by the Engineering and Physical Science Research Council and a number of industrial co-creators, with the aim of creating a comprehensive intelligent decision support and control platform. To achieve this goal, ICT-CMAC will use state-of-the-art data acquisition, signal processing, analysis, and control mechanisms, wrapped in a user-friendly electronic laboratory notebook interface for the end user.

Mission

The project consists of six integrated Work Packages (WPs) to enable specific expertise in each area to be utilized appropriately:

Data Capture and Conditioning
Sensor and Measurement Modelling



Intelligent Support Platform

Robust Plant-wide Control

People and Processes

System Integration and Communication Interfaces (commences in Year 3)

Consortium History

2015: Three academic papers published in Chemical Engineering Science and Chemical Engineering and Processing Intensification.

Structure & Governance

Work Package 1: Data Capture and Conditioning

WP1 will create an integrated, multi-input data acquisition system that will bring together all measured data to a single point for subsequent processing and analysis. Existing measurement techniques such as infrared, ultraviolet, and Raman spectroscopy will be combined with newer instrumentation such as acoustics and hyperspectral imaging. Data traffic will be optimized through the acquisition system in preparation for further real-time data analysis and control.

Work Package 2: Sensor and Measurement Modelling

WP2 will extract quantitative attributes for crystalline particles across the manufacturing process. Measured data will be used as input to data analysis and inversion techniques, which will allow best estimates of particle attributes to be made at a particular process point.

Work Package 3: Intelligent Support Platform

WP3 will deliver an intelligent support environment for the crystallization process using machine learning and statistical modeling. By combining data captured by WP1 with expert process knowledge, the analysis performed in WP3 will inform the control decisions made by WP4.

Work Package 4: Robust Plant-Wide Control

WP4 will deliver a tailored, agile, self-adaptive, and robust plant-wide control strategy. To do this, a model-based predictive-adaptive control framework will be used. A hybrid approach will combine rule-based and data-driven systems, including intelligent support information from WP3.



Work Package 5: People and Processes

After evaluation of the available options for an ICT-enabled lab environment, WP5 will implement the optimum solution, which will be deployed and trialed within the continuous manufacturing and crystallization community. Electronic laboratory notebooks will be used to bring together user experiment details, data captured, and analysis carried out into a single, coherent, and searchable platform.

Homepage

http://www.cmac.ac.uk/ICT-CMAC_overview.htm

Sponsors & Partners

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