#1

Cavitational Assisted Paraxylene Reactor Industrialization

Cavitational reactor concept for catalytic oxidation of P-XYLENE to produce TPA

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Description

Production of Terephtalic Acid (TPA) through the use of a cavitational reactor. TPA chemical used primarily in the manufacture of polyesters and PET (poly-ethylene-terephthalate).
Once industrialised, the proposed innovative cavitational reaction technology could be successfully exploited, for example, to produce biorefinery building blocks such as levulinic acid and succinic acid from bio-based wastes.

Looking for partners

SMEs/Industries - end-users of TPA, levulinic acid and succinic acid
Poles / Clusters - support in social acceptance studies of final products

#2

Membrane assisted process intensification of biocatalytic reactions

This proposal focuses on developing and intensifying enzymatic processes using membrane technologies

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Description

The emphasis of this proposal idea is on intensified enzymatic process and their demonstration at industrial scale. In particular, our proposal focuses on industrial demonstrations for (i) ester synthesis & (ii) chiral molecule synthesis, for their application in food, cosmetics, pharmaceuticals and agrochemical industry. The intensified processes aim at enhanced selectivity, less downstream processing and better product quality.

Looking for partners

- Engineering companies
- Separation technology providers
- Enzyme producers
- End users: Industrial partners active in application of esters and chiral molecules

#3

Adaptation of metal scrap recycling
Improved recycling and sorting of ferrous metal scrap to cope with variable quality of input materials by means of innovative sensor technology application

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Description

Precise and efficient recycling of end-of-life metallic scrap is essential to facilitate liquid steelmaking by selecting valuable alloys (Cr, Ni, Mo) and limiting tramp elements (Cu, Sn). However, inappropriate recycling and mixing of scrap with strongly varying properties deteriorates steel quality. A novel sensor system based on neutron activated gamma spectroscopy will be developed and applied for chemical analysis of bulk scrap and scrap sorting in liquid steelmaking. Process models will be applied to optimise scrap mix and metallurgical treatment, to efficiently produce high quality steel grades from recycled metal scrap.

Looking for partners

from other process industries dealing with recycling, sorting or usage of secondary raw materials, like non-ferrous metals (Cu, Al, heavy metals or noble metals) or non-metallic materials production.

#4

Retrofitting framework for ceramic kilns

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Description

The idea of the project is to keep different process industry plants equipment up to date from both a technological and a regulatory point of view by adapting them to new but already developed technologies and tools through retrofitting. Advanced simulation tools, cutting edge emissions abatement systems and innovative refractory materials are some of the already developed technologies that will be deployed to keep plants up to date.
CRIT and SACMI will be the actors involved in the proposal.

Looking for partners
- Existing consortia with already developed technologies to be adapted to different process industrial plants through retrofitting
- Partners from different process industries with equipment such as furnaces, reactors, raw materials handling and storage systems to be used to build project pilot actions
- Technology developers from other process industries and/or other machinery typologies (reactors, pressurized chambers…)

#5

AI for site-wide process control
To demonstrate how to utilize hybrid AI technologies in process control of an entire site

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Description

The idea is to apply hybrid AI technology for process control, in order to increase operational performance, flexibility and sustainability. Hybrid AI combines measured and 1st principles simulated data, in order to overcome possible problems of purely data based approaches. The project's demonstrations target entire sites, not just one sub-process or plant, in order to maximize impact.

Looking for partners
- Industrial sites for demos
- RTO, SMEs specialized in AI with experience on the process industry and process automation providers.

#6

Cognitive dynamic production management
Cognitive production management by integration of dynamic process models into scheduling systems

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Description

Development of a plant-wide cognitive production management system based on existing scheduling solutions, with integration of predictive and self-learning process and plant models, model-based dynamic control tools, decision making methods based on artificial intelligence as well as multi-criterial optimization methods. Application and test of the system for the steel industry.

Looking for partners

developing and applying corresponding through-process production scheduling and on-line control systems in other process industries like non-ferrous metal or chemicals production.

#7

TwinE- Digital Twins for Cognitive Energy Minimisation

Implementation and demonstration of a maintainable, standards-based digital twin for energy and carbon minimization in 2-3 European process facilities with high energy and carbon footprints.

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Description

While the idea of on-line support systems for operational optimisation is not new, we believe that current advances in platforms, analytics and sensors can make systems that support radical reductions in energy use and carbon footprint. These applications will be multidisciplinary and will combine information from legacy applications, simulation and analysis tools and novel data science and analytics. To be scalable, usable and maintainable, this digital twin must be built on a robust and pragmatic knowledge model that supports standards and simplifies maintenance and use. An initial step along this path was made in the Optique FP7 project, where diverse sources of operational data for gas turbines was integrated into a tool for support engineers.

We bring a large and important use case from the petroleum sector together with Equinor (formerly Statoil). We also bring the Optique toolbox and benefits of participating in standardisation of lifecycle information on the Norwegian Continental Shelf.

Looking for partners

Owners of use cases in metallurgy and/or chemicals, suppliers of analysis tools for energy optimization and monitoring (both commercial and research), engineering vendors, system integrators and automation vendors.

#8

Production analysis and holistic optimisation for cognitive production plants

Realize a platform for continuous process improvement supported by digitalization.

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Description

Development of technologies and methods to assist the process improvement cycle:
  (i)   critical parameter identification, sensor placement analysis and IoT network integration will be targeted to support workflow analysis and IoT integration
  (ii)   big-data processing, causal analysis (root cause), data-mining, modelling, etc. to support data analytics and knowledge discovery
  (iii) production performance optimisation will base on cognitive DSS, which will be supported by data streams and on-line evolved knowledge.

Looking for partners

System integrator, IT developers (cloud computing, platform application), IoT and advanced sensing, Industrial partners from other sectors

#9

Recommender Systems for the Process Industry

Recommender Systems for the Process Industry based on automatic Knowledge Extraction from Process Data

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Description

Recommender systems, known from Web shops as Amazon in a manner "people who viewed this item also viewed this…" are very popular applications, which try to predict the preference or behaviour of the users based on the experiences of the community. The idea of this project is to transfer the approach of "Recommender system" to industrial application, helping process operators to meet right decision in a manner "other operators in this situation met this decision…"

Looking for partners

We would like to join a consortium as a subpart of a more general project enriching it with knowledge extraction perspective. We provide experience in software development, knowledge modelling and data analytics. Further, we can bring an industrial partner from the steel industry and an industrial use case with us.

#10

Reinforced, self-healing cognitive control for material production

Automation systems can be hardened against disturbances via self-healing strategies, that apply reinforcement learning and optimization techniques to adapt to spontaneous events while keeping the production output at a reasonable fall-back optimum

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Description

Disturbances in the process chain can lead to a series of expensive problems like product defects, instable process regimes, long setup & retooling times and increased energy demand. Consequently, a rigid disturbance management within the automation layer will become quintessential for economic success. Our idea is to develop cognitive, self-healing control concepts for the process industry, which are empowered by reinforcement learning and optimization strategies. These approaches can be applied to single processes or to the whole process chain. Based on recent progresses in sensor/actuator fault analysis, process anomaly detection in industrial automation, as well as self-healing concepts introduced to smart grids, we see demand for an innovation activity to transfer such methodology to process industry. Our key competence is in the steel domain. We have experience in both proposal preparation and later project work.

Looking for partners

We seek to join an existing consortium with an established coordinator that ideally consists other process industries that can benefit from including our approaches.

#11

Digitizing production of the process industry
Providing affordable and adaptable solutions for digitizing the production of process industry in cognitive productions plants

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Description

Industrial processes are composed by disconnected systems that make it difficult to intelligently exchange data. Our idea is to work in a distributed approach that performs information processing and analysis integrating the different value chains of the production process rather than simply collecting all information for centralized analysis. The idea includes sensor data optimization for an optimal data delivery, real time monitoring and control and knowledge discovery & reporting process intelligence. This will provide AI-based services for quality control, production traceability and operational efficiency assessment. The solution is conceived to complement existing process control systems.

EURECAT has large experience in digitalization of industrial processes: PREVIEW (plastic injection process, H2020-FoF-2014), PressNozz (Artificial Intelligence and Machine Learning, BEinCPPs H2020 FoF 09-2015), FLEXICAST (metal foundry process, FoF NMBP 2012-7), MUSIC (metal and plastic production, FP7-FoF 2011).

Looking for partners

We are looking for Process Industry Partners from SPIRE sectors willing to digitize their production and transform their plants in cognitive plants.