



E-PIC Srl

www.epic-srl.com

Company Presentation

WHOIS E-PIC S.r.l.

E-PIC S.r.l. is a privately owned process engineering consulting company, based in Turin, Italy. All the members are qualified chemical engineers with expertise in process development, innovation and troubleshooting, both with conventional techniques and so-called "process intensification" ones.

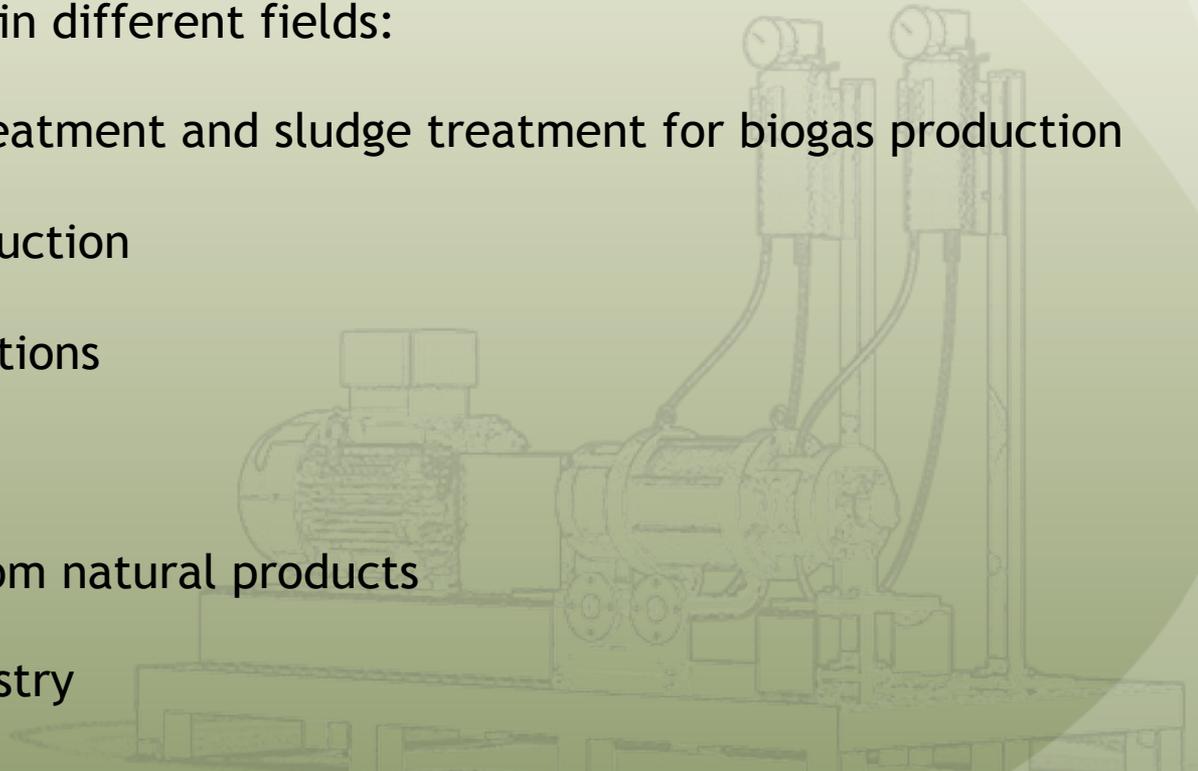
Consolidated relationship with several academic R&D excellence centers around the world, in the domain of "process intensification", grants to E-PIC S.r.l. the opportunity to offer unique process solutions to debottleneck and improve competitiveness on existing processes and plants.

E-PIC S.r.l.: Core Activity - Cavitation Technologies

E-PIC S.r.l. provides a new and innovative hydrodynamic cavitation technology (**ROTOCAV**), which can be installed for different applications and in different fields:

- Biomass pretreatment and sludge treatment for biogas production
- Biodiesel production
- Chemical reactions
- Food industry
- Extractions from natural products
- Cosmetic industry

E-PIC S.r.l. operates several hydrodynamic cavitation pilot plants to test specific applications based on customer needs



Cavitation Technologies: Biomass Pretreatment For Biogas Production

ROTOCAV can increase the methane yield up to 20% (mean value 10%) and it can increase the total volume of produced biogas up to 20% too: hydrodynamic cavitation can disgregate the biomass and increase its specific surface area, total pore and micropore volumes.



The pretreatment of the wheat straw with ROTOCAV ensured an increase in specific surface area, total pore and micropore volumes by a factor of 50%, compared to the wheat straw before the pretreatment.

Moreover, the pretreatment ensured a biomass delignification by a factor of 25% and deacetylation of carbohydrates.

Cavitation Technologies: Biodiesel Production

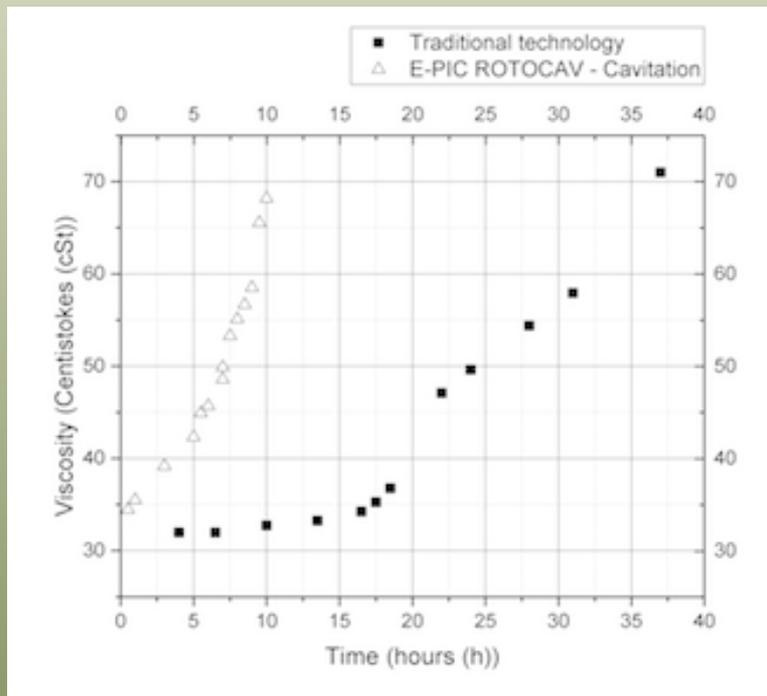
ROTOCAV generates controlled hydrodynamic cavitation to produce biodiesel from vegetable oils, animal fats and biodiesel from waste cooking oil.

ROTOCAV technology is able to transform triglycerides into biodiesel continuously, or in batch or semi-batch, providing small, medium and large size plants. Conversion to biodiesel is 99% m/m (minimum conversion for EN-14214 (EN-14103) is 96,5% m/m).

ROTOCAV technology produces high quality biodiesel at low operative costs; check results of analysis of our biodiesel made by INNOVHUB

Cavitation Technologies: Chemical Reactions

ROTOCAV can be applied to reactive homogeneous and heterogeneous systems, when mass transfer is of fundamental importance for chemical reactions to proceed.



In this case study, oxidation of waste vegetable oil the reaction time decreases from 37 hours with the traditional technology to 10 hours.

The hydrodynamic cavitation effect, induced by **ROTOCAV** treatment, is able to generate a stable dispersion with air micro-bubbles homogeneously dispersed in the continuous oily phase. The gas-liquid surface area increases, promoting the reaction, now limited by only the chemical kinetic.

Cavitation Technologies: Food industry

ROTOCAV can be successfully applied for mixing and homogenization

- Solids in liquid: a controlled particle size reduction occurs during the treatment, increasing solids dissolution in the liquid medium and promoting the generation of uniform and homogeneous suspensions
- Liquid in liquid (also with different viscosities)
- gas in liquid: dispersion of microbubbles of N_2 and CO_2 in beer or beverages (to enhance taste and texture of some mousse souse and yoghurt and/or to increase product shelf life)



Cavitation Technologies: Extractions From Natural Products

Bioactive substances recovered from natural products are of great interest in cosmetic, pharmaceutical and food industries.

Traditional methods to obtain extracts from natural matrices require long processing time, large amounts of solvents and some of the main drawbacks are partial loss of volatiles and degradation of the target molecules.

ROTOCAV enhances mass transfer avoiding heating of the bulk and thermal degradations, promoting the release of bioactive substances from the plant matrix by disrupting cell walls.



Case studies: extractions from vanilla, wormwood, passion flower, black tea, chamomile, cranberry, maté, guaraná, pepper, garlic, ginseng, tomato peels, carrots, olive tree leaves, grape seeds, orange seeds and peels, cocoa waste, hazelnuts, stevia leaves, etc.

Cavitation Technologies: Cosmetic industry

ROTOCAV hydrodynamic cavitation technology can be successfully applied for the optimization of the main process steps of Cosmetic Industry (mixing, homogenization, solubilization, functionalization, hydration of thickeners and stabilizers, production of stable emulsions) for the preparation of lotions, creams and ointments.

In a single passage into the cavitation chamber it is possible to mix viscous fluids, even with different viscosities and homogenize dyes/pigments/fragrances, or stabilizers, or active ingredients into the product.

The result of the rapid and cheap treatment is a high quality final product.



E-PIC S.r.l.: Side Activities

E-PIC S.r.l. can offer scientific and technological support in the optimization of existing processes as well as in the frame of technology development projects, in all phases of the development path, till industrialization.

E-PIC S.r.l. approach consists in designing or re-engineering a process till chemical kinetic is the only limiting step: this means that all other processing limits, such as mass transfer, heat transfer and diffusion mechanisms are eliminated.

E-PIC S.r.l. established and continues to improve relationships and cooperations with academic centers, so to enhance University-industry technology transfers, with the aim to improve scientific knowledge and the development of innovative techniques and the implementation of new solutions.

E-PIC S.r.l.: Side Activities

Development of innovative technologies

E-PIC S.r.l. provides research and development support activities, innovation and optimization of processes, assistance and consulting services, through technological and scientific innovation transfers from academic to industrial field. More into details, it provides technical support in designing and development of new equipment and engineering knowledge in:

- Research and development activities
- Prefeasibility studies
- Multi-client reports
- Design and engineering of bench scale and pilot plants
- Scale up and design of industrial plants
- Problem solving
- Support in the development of research projects funded by European Community, Ministry of Economic Development and Italian Regions