

Advantages

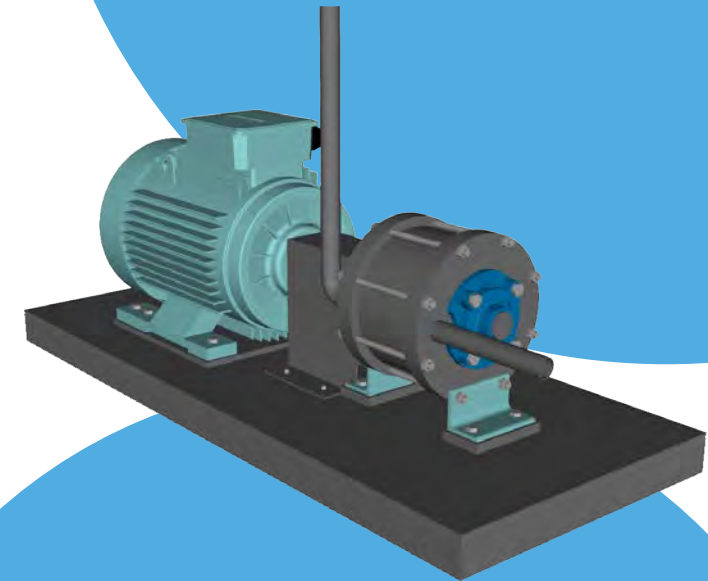
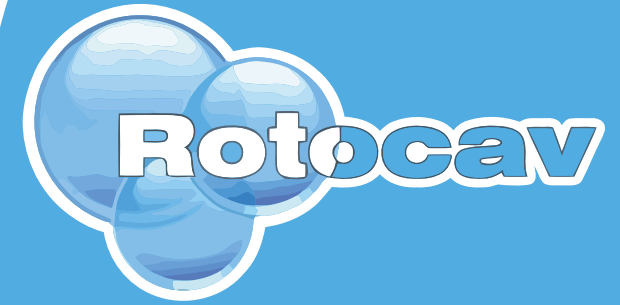
- Process efficiencies improvement
- Space requirements and footprinting minimization
- Process overall carbon footprinting minimization
- Time, operating cost, capital cost saving
- Product quality and yield improvement
- Low power mixing for most all applications
- More effective and efficient mixing
- Mass transfer maximization
- Easy, compact, durable technology
- Safe and efficient technology
- Easy scale-up, installation, replacement and maintenance

E-PIC S.r.l. is a privately owned process engineering consulting company, based in Turin, Italy. Expertise in induced acoustic and hydrodynamic cavitation for cleaning, disinfecting/sterilising, and chemical reaction modeling, transient simulations and designing elements and 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.



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CAVITATION PHENOMENON AND BUBBLES DYNAMIC

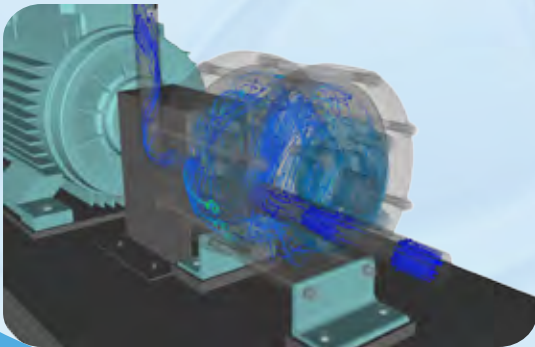
ROTOCAV device is designed to generate "controlled cavitation" on liquid phases.

Cavitation is defined as the formation of vapor phase of a liquid when it is subjected to reduced pressure at constant ambient temperature.

When a liquid is forced through certain constrictions the kinetic energy of fluid increases and pressure decreases. When liquid pressure falls close to its vapor pressure, bubbles are generated.

When the fluid decreases in velocity, pressure recovers and bubbles collapse in a confined area.

As microscopic cavitation bubbles are produced and collapse, shockwaves are given off into the liquid: the implosion of the vapor bubbles creates intense pressure and temperature conditions as well as shear forces in the bulk media.



Summarizing, cavitation is defined as the phenomenon of formation, growth and subsequent collapse of microbubbles or cavities occurring in extremely short time interval.

ROTOCAV - CAVITATION TECHNOLOGY

ROTOCAV is a patented technology that achieves controlled hydrodynamic cavitation by forcing fluid through its rotor-stator apparatus.

The ROTOCAV design is defined according to process intensification approach that improves the development of faster, cleaner, smaller and cheaper devices.

During high speed rotation, rotor channels are periodically aligned with stator channels. The processed liquid is accelerated in the radial direction and, flowing through the free channels, is subjected to a pressure wave resulting in cavitation. Cavitation is one of the most efficient energy techniques for the intensification of process applications and it is really appealing compared to conventional methods.

The main advantage is the generation of local zones with very high temperature and pressure, while the overall environment remains at ambient conditions.

ROTOCAV LABORATORY UNIT



APPLICATIONS

- Particle size reduction
- Homogenization and mechanical treatment of immiscible liquids to form stable emulsions
- Wastewater treatment
- Debacterization
- Oxidation reactions
- Extraction
- Delignification of wheat straw for paper manufacturing
- Upgrading of crude oil
- Bioethanol yield enhancement
- Biodiesel production
- Cooling towers

MAIN ADVANTAGES

- Modular design validated through complete dynamic CFD simulation as well as with extensive design of experiments
- Outstanding performance in micro-mixing
- Fully continuous operation
- Compact system: multiple process steps in one machine: mixing, disintegration, homogenization
- Processing of a great variety of feedstocks
- Short processing time in comparison with traditional reactors
- Maximization of the micro-mixing, of available phase interface area and of the use of reagents
- Lower operative costs in comparison with traditional reactors
- Small reaction and mixing hold-up
- Easy scale-up
- High quality and top reliability seals, double cartridge systems with dedicated pressure locking vessels
- Self-draining design
- Construction in AISI 316 and duplex steels
- Closed system, no emission of hazardous gases or dust