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TUTECH



ULTRAWAVES
WASSER & UMWELTECHNOLOGIEN GMBH

**ULTRAWAVES - HIGH-POWER ULTRASOUND SYSTEMS
FOR WATER AND ENVIRONMENTAL ENGINEERING
-
EEN COMPANY MISSION - CHENGDU VISIT**

Dipl.-Ing. Gunnar Klingspor



ULTRAWAVES WATER & ENVIRONMENTAL TECHNOLOGIES

- ▶ Spin-off-Company from Hamburg University of Technology
- ▶ Founded 2001
- ▶ 15 technical employees, 12 part-time workers & students
- ▶ Managers: Dr. K. Nickel, Prof. (em.) Dr. U. Neis
 - ▶ Research group „Ultrasound in Environmental Eng.“ (Prof. (em.) Dr. U. Neis)
 - ▶ 20 years experience in ultrasound applications
 - ▶ 100 publications
 - ▶ International conferences: 1999, 2002, 2005

TUHH
Technische Universität Hamburg



ULTRAWAVES WATER & ENVIRONMENTAL TECHNOLOGIES

We offer

- ▶ Planning
- ▶ Design & Development
- ▶ Production



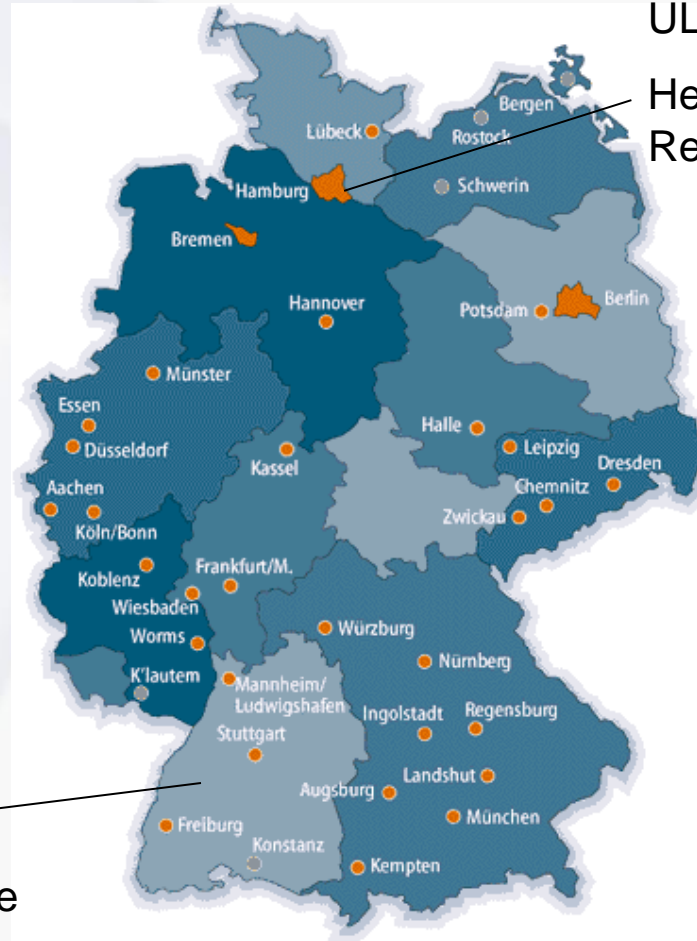
of high-power ultrasound (HPUS) systems for environmental applications (for municipal and industrial environmental engineering), especially for the treatment of

- ▶ water
- ▶ wastewater
- ▶ biomass (sludge)



ULTRAWAVES WATER & ENVIRONMENTAL TECHNOLOGIES

ULTRAWAVES-Hamburg:
Headquarter: Management,
Research & Development



ULTRAWAVES-Karlsbad:
Development and Manufacture



ULTRAWAVES INDUSTRY PARTNER SONOTRONIC NAGEL GMBH



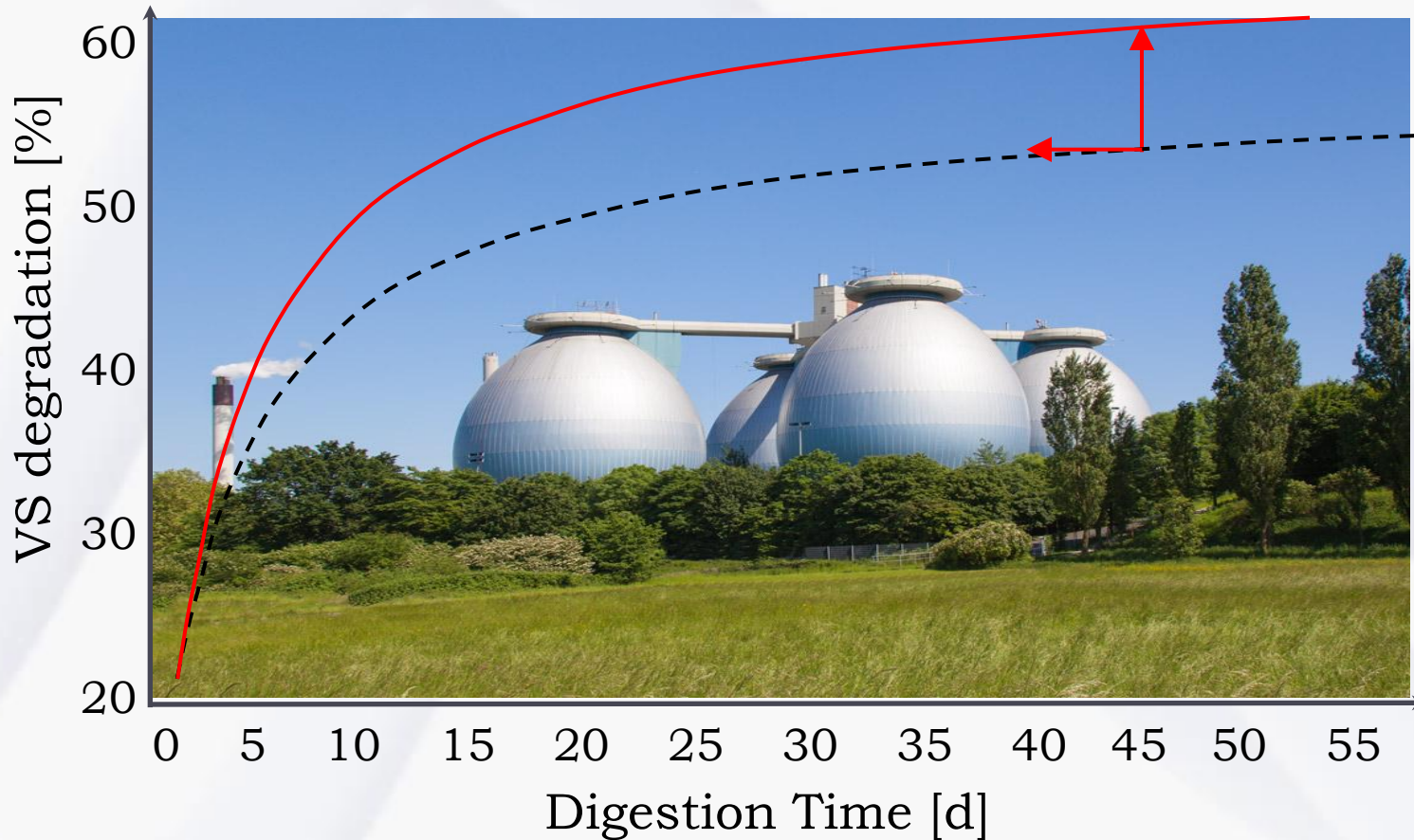
- ▶ German leading supplier of high-power ultrasound equipment
- ▶ Founded 1975
- ▶ 450 employees
- ▶ Manufacturer of high-quality sonotrodes and generators
- ▶ Substitutions in Germany (headquarter), Italy, Spain, UK, USA, Brazil, China, Hong-Kong, South Africa



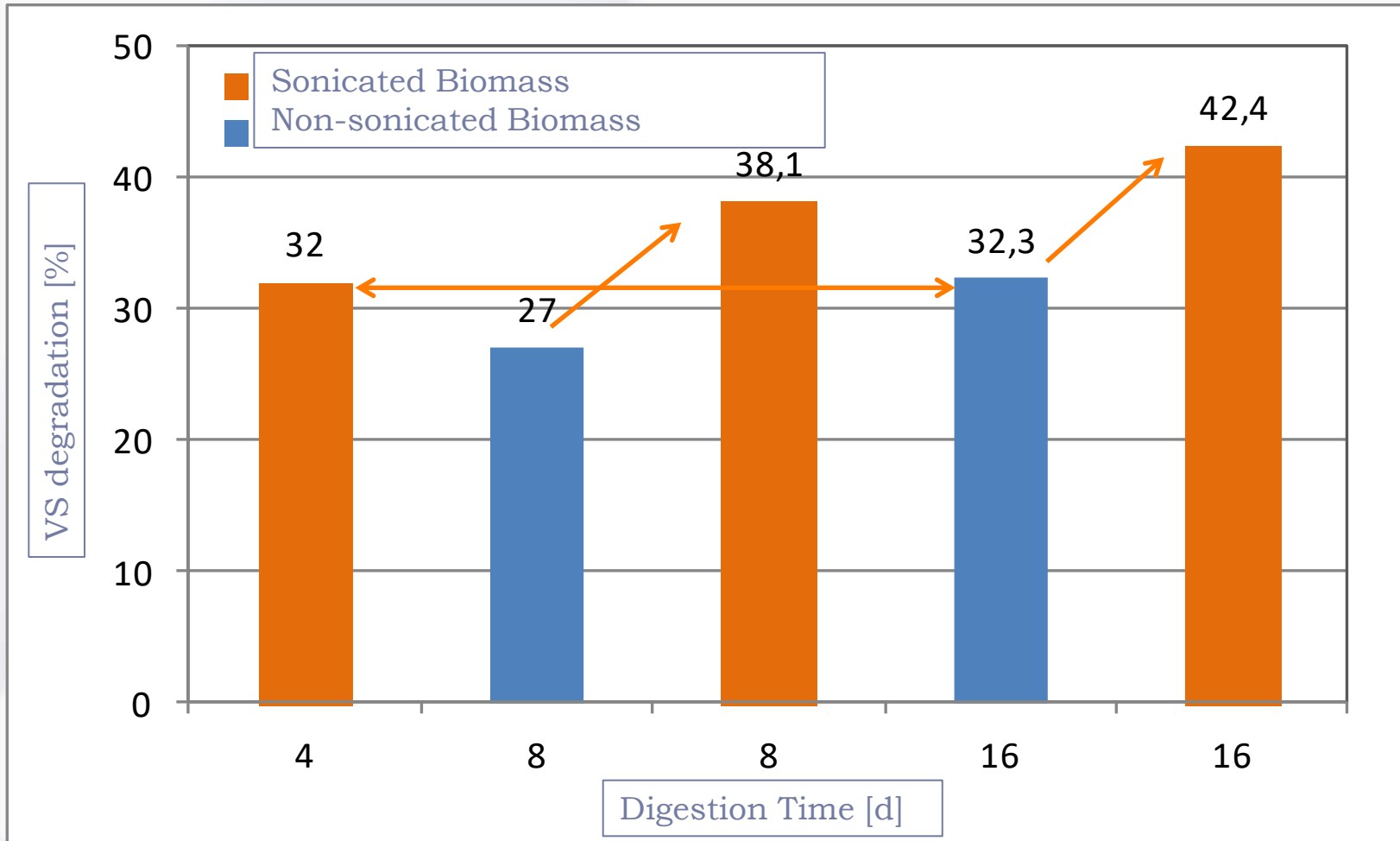
Disintegration of Biomass by High-Power Ultrasound (HPUS)



OVERCOMING THE LIMITATIONS OF ANAEROBIC DEGRADATION WITH ULTRAWAVES HPUS



OVERCOMING THE LIMITATIONS OF ANAEROBIC DEGRADATION WITH ULTRAWAVES HPUS

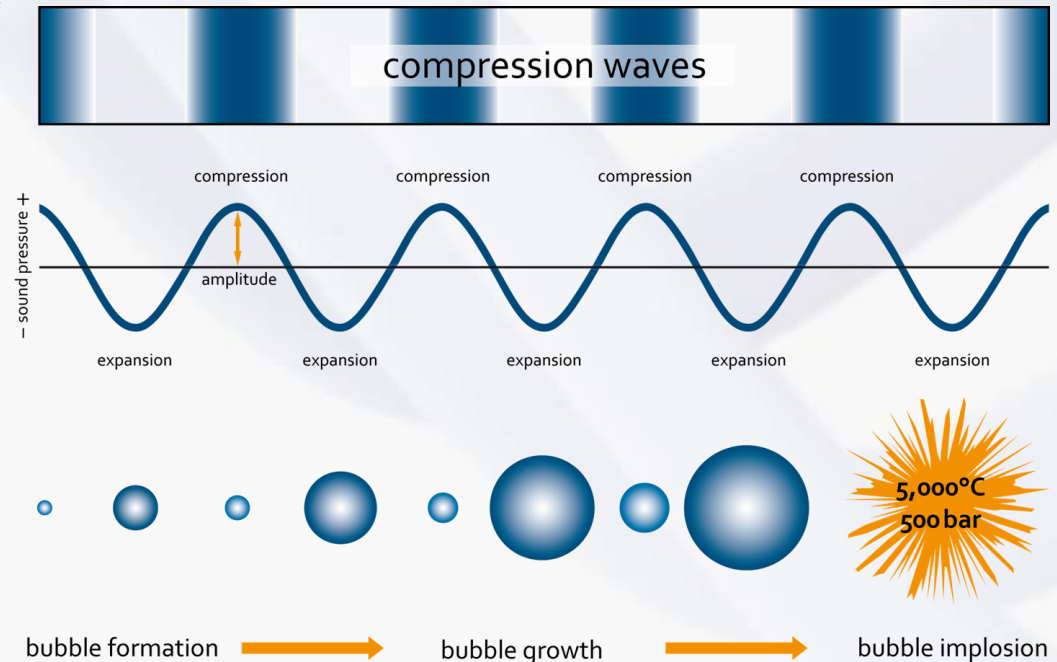


HIGH-POWER ULTRASOUND (HPUS)

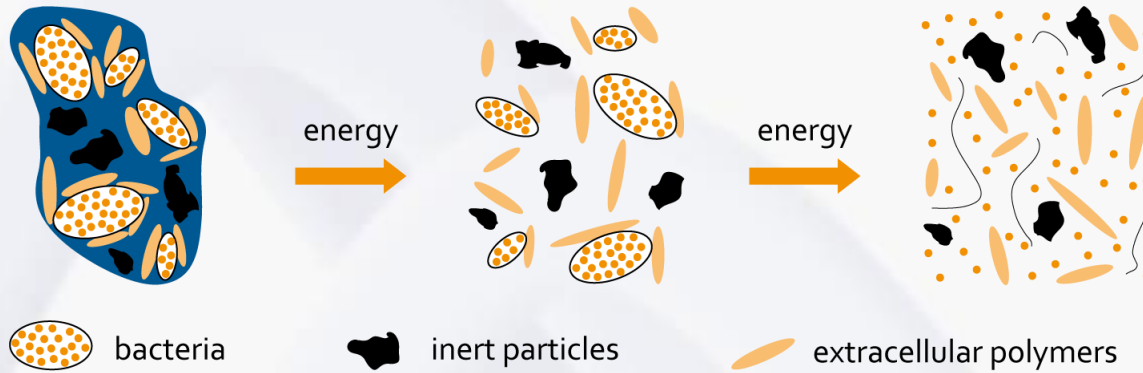
▶ At right frequencies and intensities (≥ 20 kHz & 25 to 50 W/cm²) high-power ultrasound (HPUS) produces ultrasonic cavitation

▶ Cavitation effects:

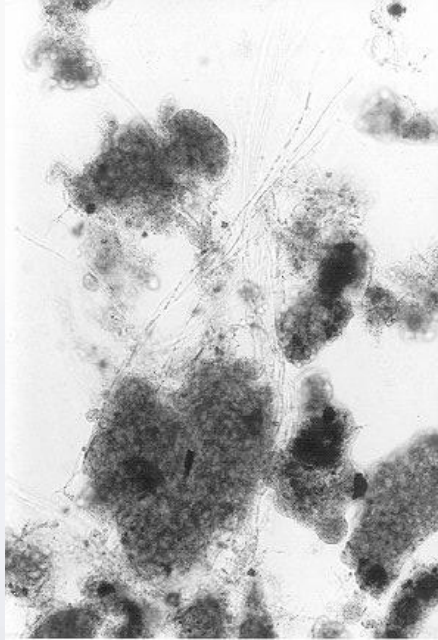
- ▶ High mechanical shear forces
- ▶ Radical reactions



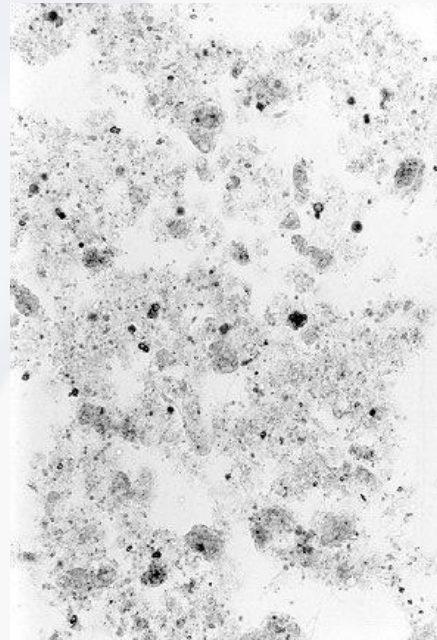
DISINTEGRATION OF BIOSOLIDS BY HPUS



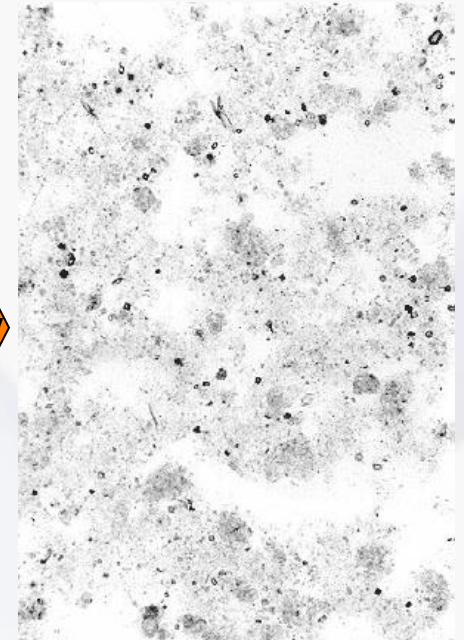
LIGHT-MICROSCOPICAL ANALYSIS



untreated WAS



30s sonicated



90s sonicated



OVERCOMING THE LIMITATIONS OF ANAEROBIC DEGRADATION WITH ULTRAWAVES HPUS



Digester 1 without HPUS:
Lower biogas production
Higher viscosity

Digester 2 with HPUS:
Higher biogas production
Lower viscosity



FULL-SCALE ULTRAWAVES HIGH-POWER ULTRASOUND SYSTEM 2006

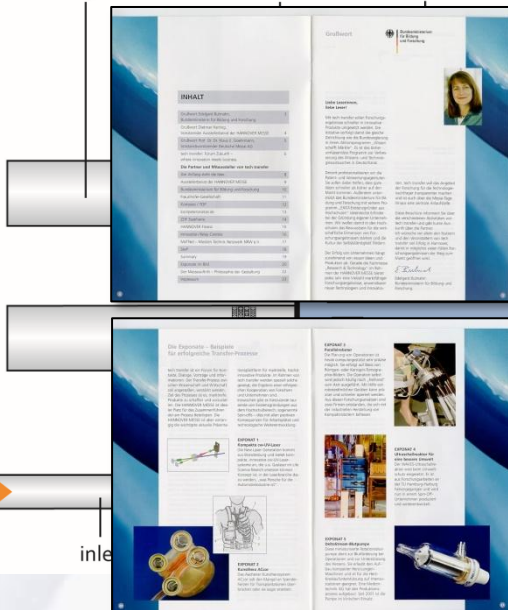
**Technology Transfer
Innovation 2002**

**Innovation Award
German Industry 2006**

**Innovation Award Baden
Württemberg 2007**

venting tube booster cavitation field outlet

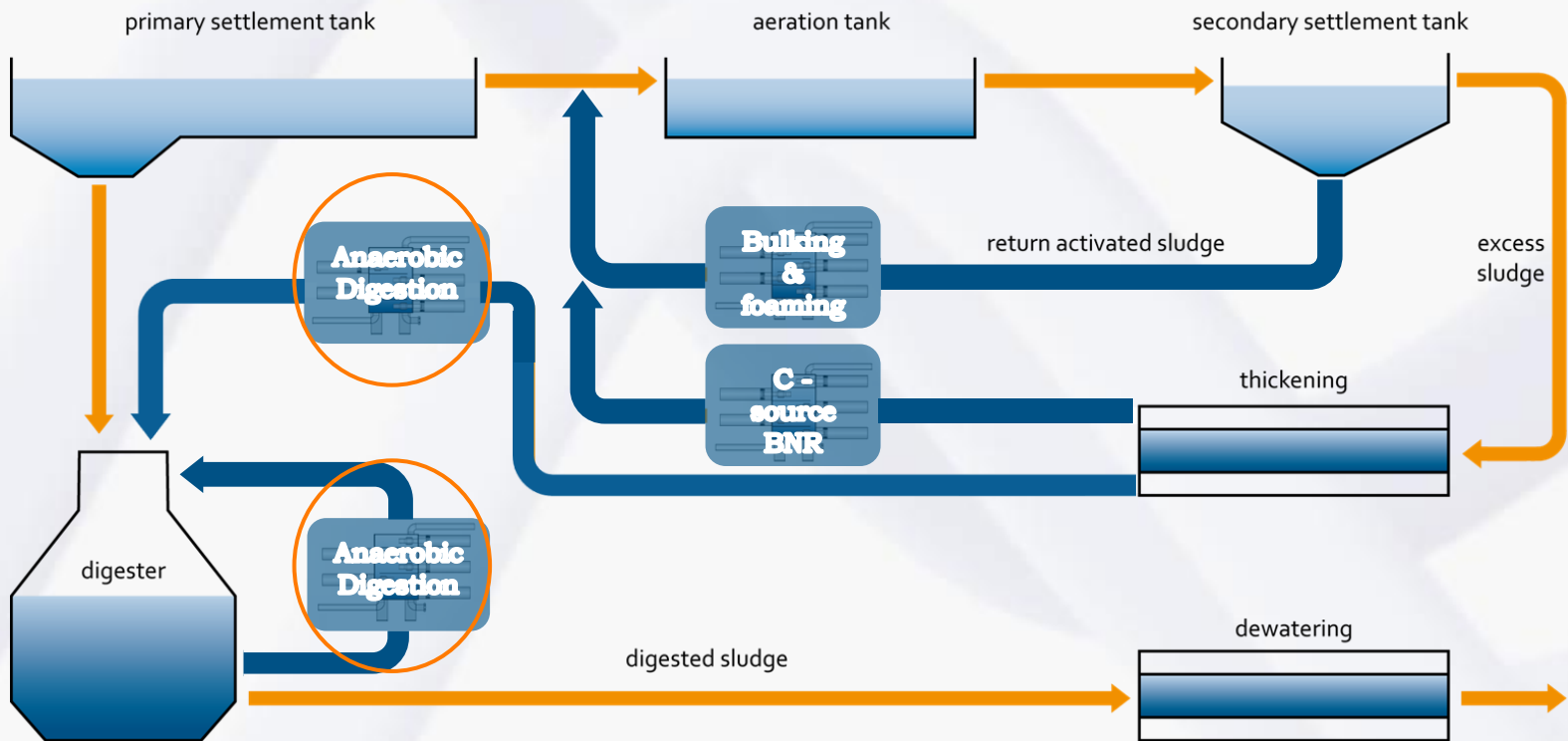
Reactor volume: 30 L



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OPTIONS FOR BIOSOLIDS DISINTEGRATION



BIOSONATOR COMPACT: P&P-SYSTEM

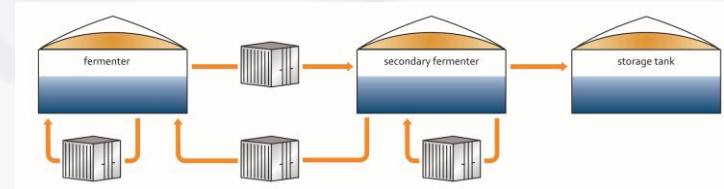
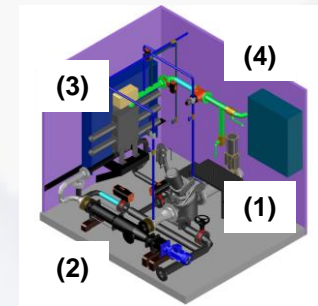


BIOSONATOR: P&P-SYSTEM



▶ Components:

- ▶ Macerator (1)
- ▶ Modified Excentric Screw Pump (2)
- ▶ HPUS (3)
- ▶ Volumetric flowmeter (4)



- ▶ Completely automated (24/7) & simple integration



ULTRAWAVES HPUS TECHNOLOGY: WORDWIDE REFERENCES



ULTRAWAVES – A Worldwide Connection



ULTRAWAVES – A WORLDWIDE CONNECTION

The image displays a world map with several brochures and posters for ultrasonic technology products, illustrating a worldwide connection. The products and their associated companies are:

- EIMCO Sonolyzer**: Sludge Disintegration and Minimization. Sledge/Biosolids Management. EIMCO WATER TECHNOLOGY.
- ULTRADŹWIĘKOWA DEZINTERGRACJA OSADU ŚCIEKOWEGO**: ...sila ultradźwięków. CES.
- SONOFLEX™**: Réacteur de prétraitement de la boue par Ultrasons. TUHH.
- 슬러지리액터**: 슬러지리액터. 한국텍스.
- 超音波汚泥減量化装置 ~ウェーブスリマー~**: 株式会社 西島製作所.
- Csúcs technológia az iszapkezelésben**: Ultrahangos sejtborítás kavicsokkal. "SONOTROP" REAKTOR. EURO-OPEN KFT. Őtlet, Innováció, Forgalmazás. www.euro-open.hu.
- 为您的污水厂 节省费用**: 污水厂综合解决方案 超声波污泥活化技术. SCODEN ULTRAWAVES.
- Ultra Sonic Reactor (USR)**: Ο ΑΝΤΙΔΡΑΣΤΗΡΑΣ ΥΠΕΡΗΧΩΝ ΣΤΗΝ ΥΠΗΡΕΣΙΑ ΓΡΩΤΕΣΤΑΣΙΑΣ ΤΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ. CHEM-TEC.
- DUMO Ultralyzer**: DUMO. tosend.
- 超音波汚泥活化装置**: コトブキ ウェーブインバクター. 株式会社 興五資株式会社.
- BioSolids Treatment Innovation**: BioSolids Treatment Innovation.



Thank you for your attention!

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Any questions?

