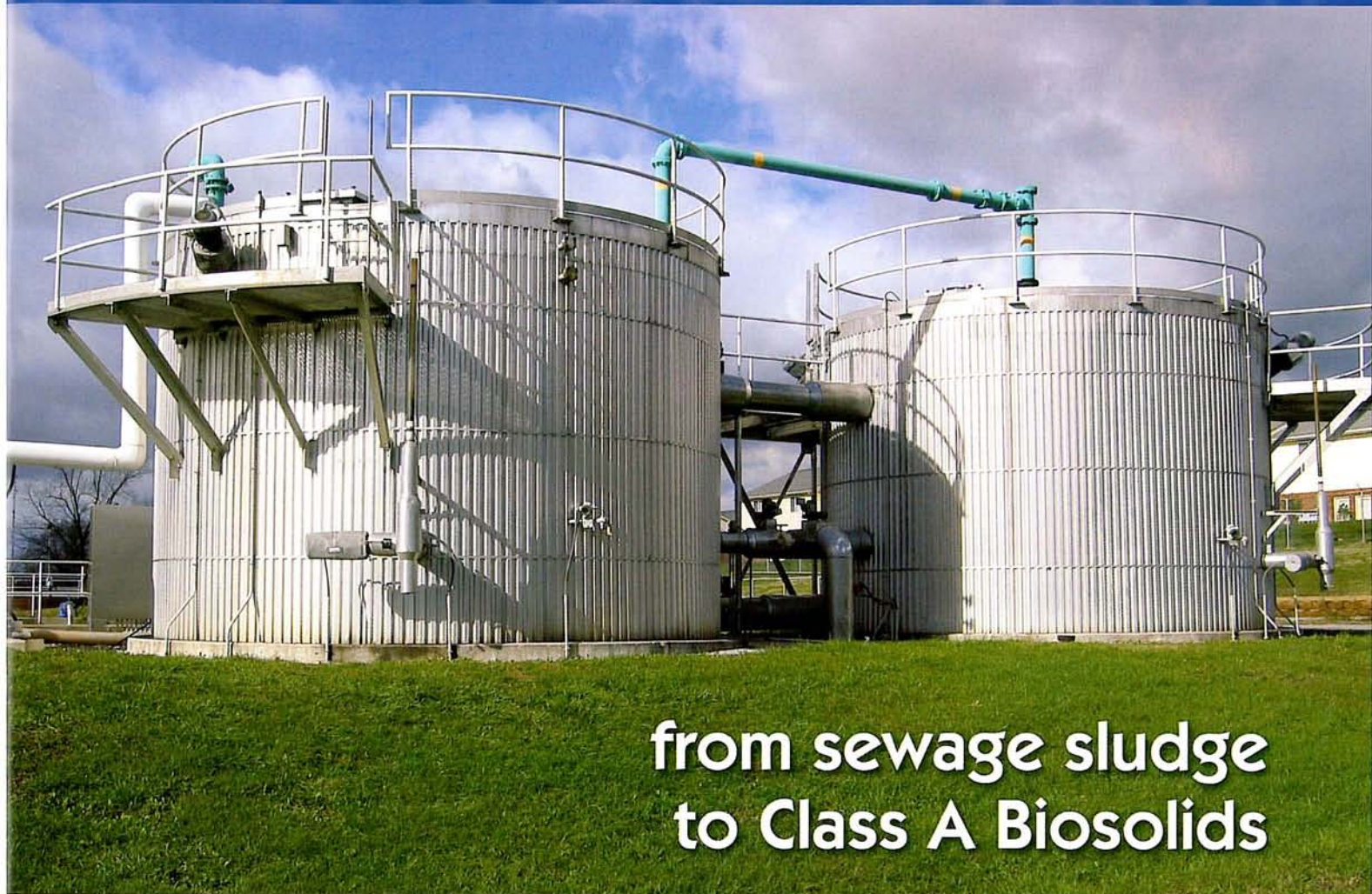
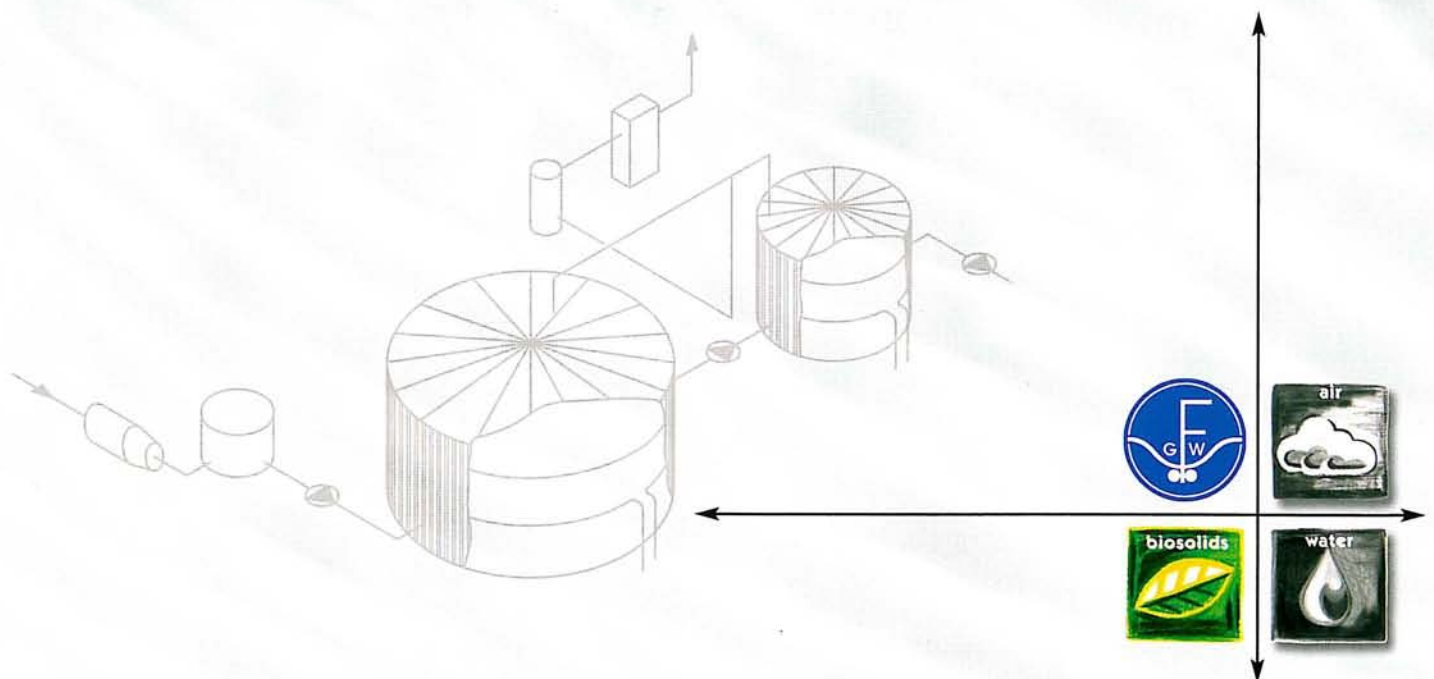


FUCHS ATAD Process

Advanced Integrated Concept



from sewage sludge
to Class A Biosolids



How to make Class A Biosolids: FUCHS ATAD Process

FUCHS ATAD Process: The economical and reliable way from sewage sludge and manure to Class A Biosolids

Nowadays, we recognize sewage sludge and manure as valuable resources for nutrients and soil improving organic carbon.

Returning sludge and manure into the natural cycle provides not only ecological, but also economical benefits.

Autothermal Thermophilic Aerobic Digestion (ATAD) is a process for effective stabilization and reliable pathogen reduction.

ATAD turns sewage sludge into Class A Biosolids – permitting their beneficial reuse to the best advantage of nature.



ATAD plant in Wisconsin, USA,
for a total population of 48,000 (2.53 MGD)

Fundamentals of the ATAD process

Digestion is the biological degradation of organic solids. Natural aerobic digestion processes release energy, mainly in the form of heat.

The ATAD-technology takes advantage of thermophilic aerobic micro organisms (> 50 °C) which due to their rapid growth overwhelm other bacteria. The FUCHS ATAD Process provides them an ideal environment.

Pathogens, however, are inactivated and killed. Final products of the thermophilic digestion are low energy components such as water and carbon dioxide.

Benefits of the FUCHS ATAD Process

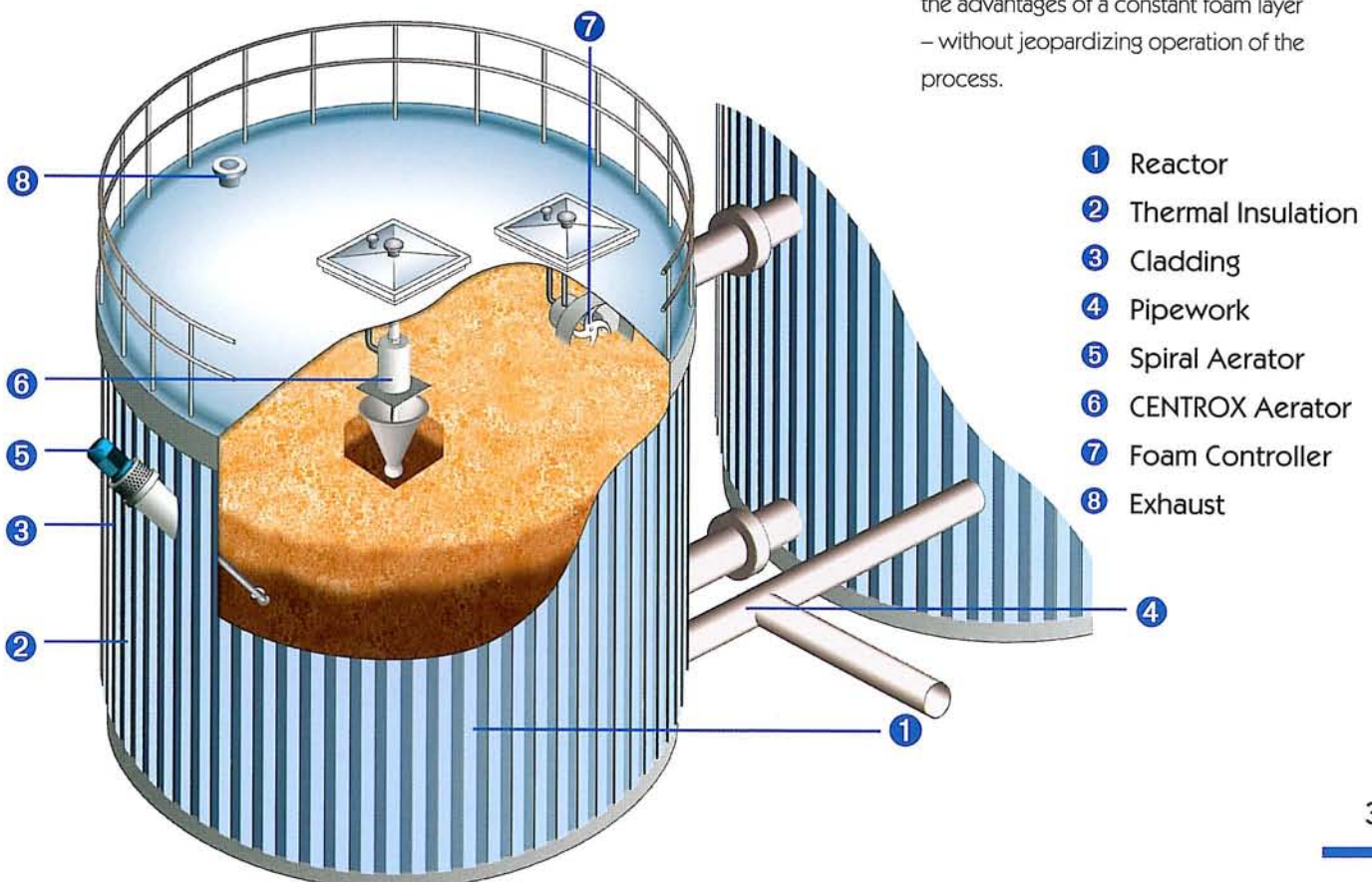
- meets or exceeds international biosolids standards
- approved process technology
- over 30 years of experience
- simultaneous stabilization and disinfection
- short retention time (6 to 9 days)
- small footprint
- low investment costs
- excellent process stability and reliability
- flexible operation
- easy extension of capacity
- many municipal and industrial reference installations worldwide

FUCHS equipment: The key to a successful ATAD operation

ATAD systems depend on sturdy and reliable aeration and foam control equipment. FUCHS Spiral Aerators and FUCHS CENTROX Aerators are designed especially for the use in ATAD reactors. They have proven their performance and reliability over many years. They do not have submerged bearings or seals and all submerged components are made of stainless steel or plastics.

Aeration of sludge generates foam so that dense foam layers build up rapidly on the surface. Such foam layers improve oxygen transfer and thus beneficially contribute to the process performance, but their height must be kept under control. Effective foam control is an essential element of ATAD technology.

FUCHS Foam Controllers permit utilizing the advantages of a constant foam layer – without jeopardizing operation of the process.



- 1 Reactor
- 2 Thermal Insulation
- 3 Cladding
- 4 Pipework
- 5 Spiral Aerator
- 6 CENTROX Aerator
- 7 Foam Controller
- 8 Exhaust

ATAD AIC™

Raising ATAD to a new level

FUCHS ATAD Process is efficient for liquid manure and virtually all kinds of sewage sludge. It is designed to operate in a flexible two-stage batch mode. While other concepts face recurring problems, our flexible two-stage mode of operation has proven for over 30 years

superior performance and process stability. FUCHS ATAD AIC™ (Advanced Integrated Concept) makes the FUCHS ATAD Process even more powerful. We achieve this by integrating an advanced ATAD process into a new concept, comprising a configuration with new and superior

process equipment in the whole biosolids treatment line.

We thicken the feed sludge without addition of polymers. This does not only save polymer costs, but significantly improves the dewaterability of the digested biosolids.

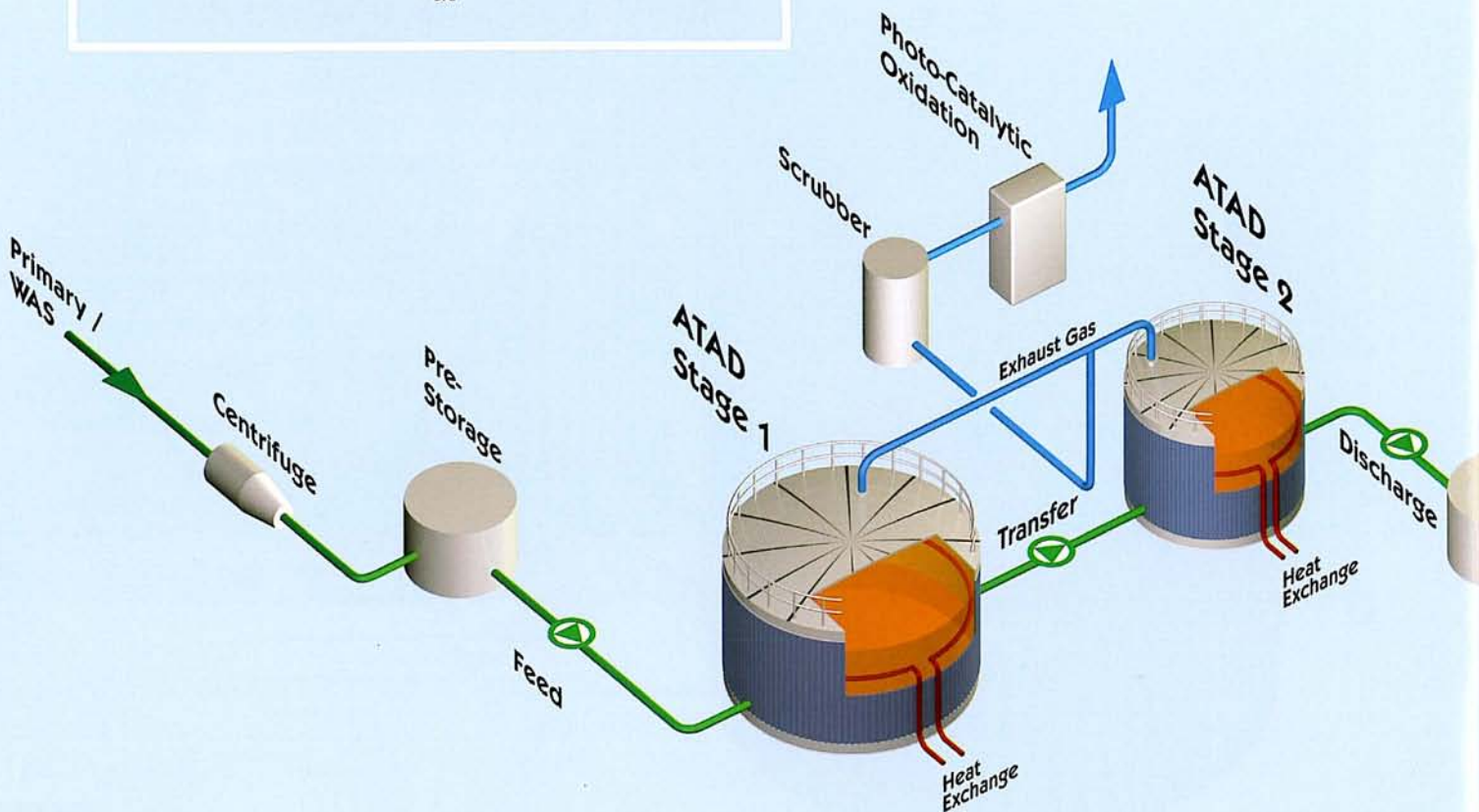
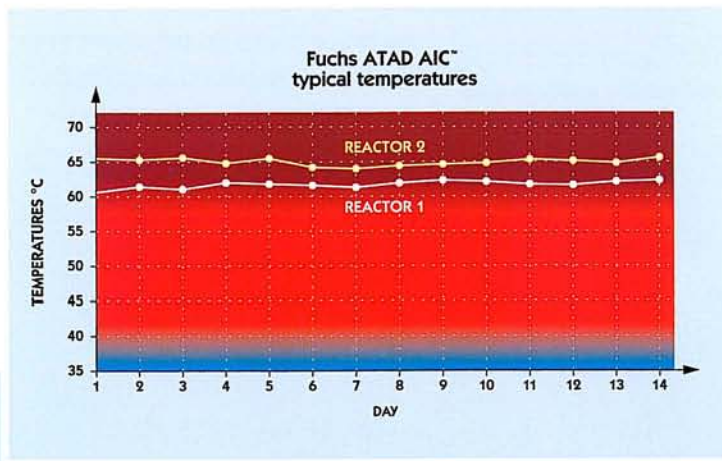
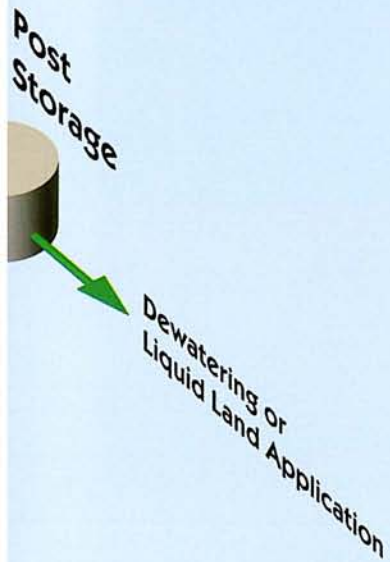


Photo-Catalytic Oxidation
for exhaust deodorization



ATAD plant in Poland
for a total population of
67,500 (3.57 MGD)



Exhaust gas from the ATAD reactors is treated by **Photo-Catalytic Oxidation (PCO)**, a very reliable and virtually maintenance-free technology for odor control. The past has shown that peak loadings, occurring in ATAD off-gas frequently, can be a problem for biofilters. The performance of the Photo-Catalytic Oxidation system, however, remains unaffected by such peak loads.

Our FUCHS ATAD AIC™ concept also includes a first reactor that is bigger than the second reactor. Using two stages

different in size improves the energy balance of the ATAD process. The sludge in the larger first reactor heats up faster and to a higher temperature. While some single-stage designs of other suppliers suffer from unjustifiable long retention times, our FUCHS ATAD AIC™ systems performs well with retention times as short as 6 to 9 days.

The combination of all these improvements by our FUCHS ATAD AIC™ concept make ATAD an even more efficient and dependable process.

FUCHS ATPT: a performance breakthrough for your anaerobic digester

Aerobic Thermophilic Pre-Treatment (ATPT) before anaerobic digestion provides the following features:

- reduction of solids freights entering anaerobic digesters,
- organic substrates are hydrolyzed during pre-treatment and the subsequent anaerobic degradation is accelerated (hydrolysis is the velocity limiting step of anaerobic digestion),
- sludge is autothermally heated and disinfected during aerobic thermophilic pre-treatment (heating of the anaerobic digester is no longer required).

Where relief of overloaded anaerobic digesters plus disinfection are the objectives, the retention time must be long enough to achieve sufficient aerobic degradation for autothermal sludge heating to thermophilic temperature. Alternatively, sludge-to-sludge heat exchangers can be provided that cool the pre-treated sludge before it enters the anaerobic digester and simultaneously pre-heat the raw sludge before it enters the ATPT. Supplemental heat can additionally be introduced.

Where disinfection is the sole objective, the retention time of the ATPT is below two days. Aeration is limited to restrict aerobic degradation of volatile solids and to maintain a high bio-gas production in the anaerobic digester. In this case sludge-to-sludge heat exchangers are required for heat recovery. Thus, the anaerobic digesters usually require no supplemental heating as the sludge is already fed at mesophilic temperature.

FUCHS ATPT system in Germany
for a total population of 36,000 (1.90 MGD)



Why only municipal sludge?

ATAD applications for industrial waste

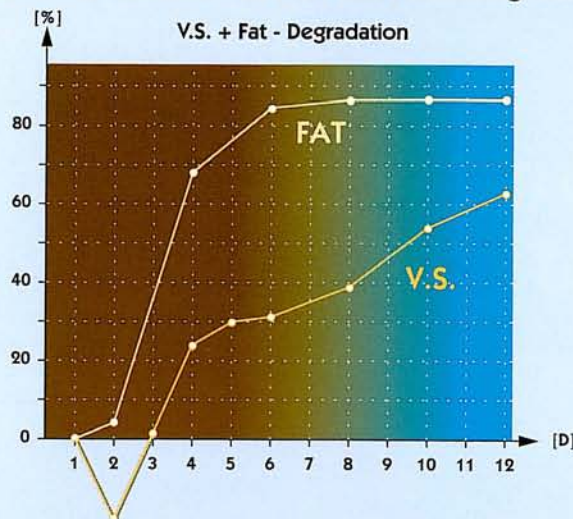
Nearly all existing ATAD plants treat municipal sewage sludge.

Trials with FUCHS pilot plants proved that the ATAD process is also applicable for purely industrial wastewater sludge. In particular sludge from the food processing industry can be well treated in ATAD systems; their sludge contains no significant heavy metals and other contaminants and can be used for land application, fertilizing and soil improvement.



ATAD-pilot plant operated in Australia with industrial sludge

ATAD Performance with Pet Food Processing Waste

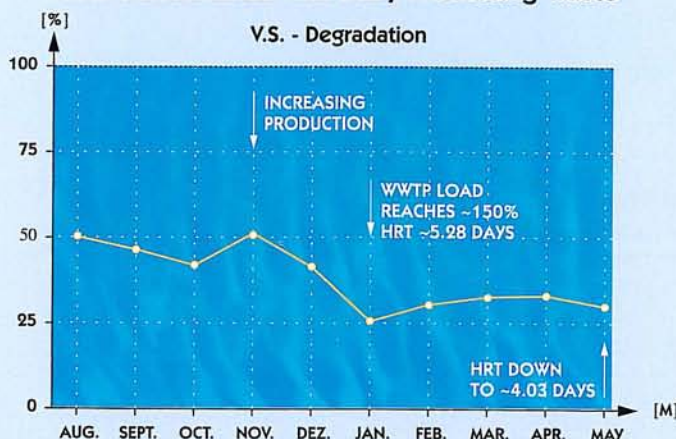


Such organic sludge is very well degradable and easily autothermally heats up to disinfecting temperature. We have performed successful pilot tests with sludges from dairies, potato and pet food processing.

Our pilot plants are equipped with self-aspirating aerators, foam controllers and integrated heat exchangers for control of the reactor temperature. We offer pilot plants for rental and operation by the customer, or alternatively, to perform entire pilot tests with FUCHS personnel on-site.

After pilot testing we have successfully designed and built full-scale ATAD systems for a dairy, a potato processing factory and a paper mill.

ATAD Performance with Dairy Processing Waste



FUCHS – Programmed Progress

Wastewater Treatment
Sewage Sludge Treatment
Odor Control

Our Customers

- Municipalities
- Operators of Wastewater Treatment Plants
- Breweries
- Dairies
- Distilleries
- Fruit Processing
- Vegetable Processing
- Juice Production
- Potato Processing
- Canned Food Production
- Pet Food Production
- Starch Production
- Yeast Production
- Meat Processing and Packing
- Rendering
- Slaughterhouses
- Tanneries
- Textile Industry
- Pulp and Paper Industry
- Pharmaceutical Industry
- Petrochemical Industry
- Chemical Industry

Our Applications

- Aerated Lagoons
- Activated Sludge Plants
- Systems for Nitrification/Denitrification
- Systems for Biological Phosphorus Removal
- Aeration of Rivers and Lakes
- Cleaning of Storm Water Tanks
- Neutralization of Alkaline Wastewater with Flue Gas
- Biosolids Treatment
- Odor Control

Our Equipment

Aerators

- Spiral Aerator
- CENTROX Aerator
- CENTROX Aerator with Foam Control
- COMBISTAR for SBR
- AEROSTAR Aerator

High Speed Mixers

- TURBOSTAR Mixer
- Submerged TURBOSTAR Mixer

Sludge Treatment

- ATAD (Autothermal Thermophilic Aerobic Digestion)

Odor Control

- PCO (Photo-Catalytic Oxidation)
- IAO (Ionisation and Activation of Oxygen)
- Biofilters

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