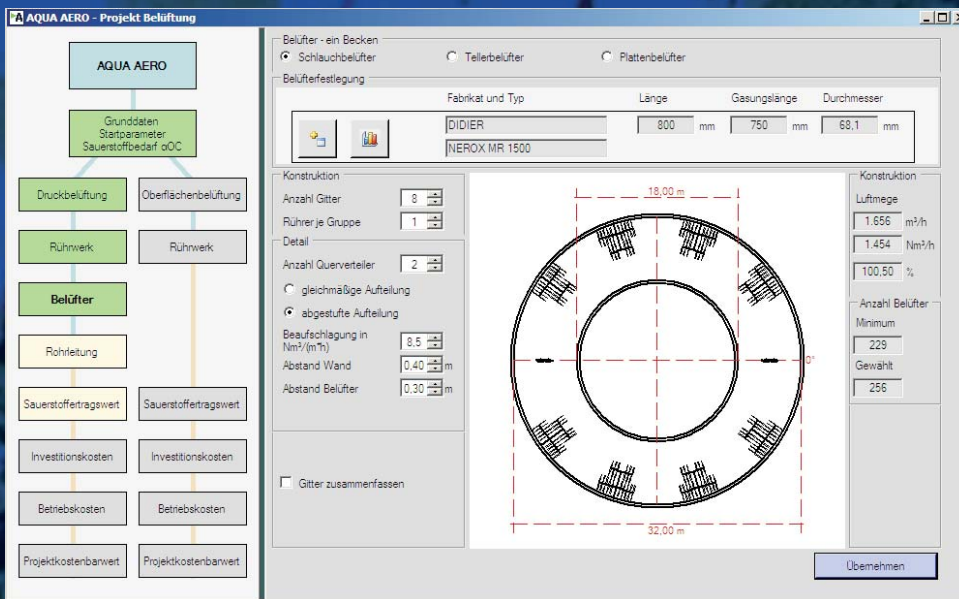
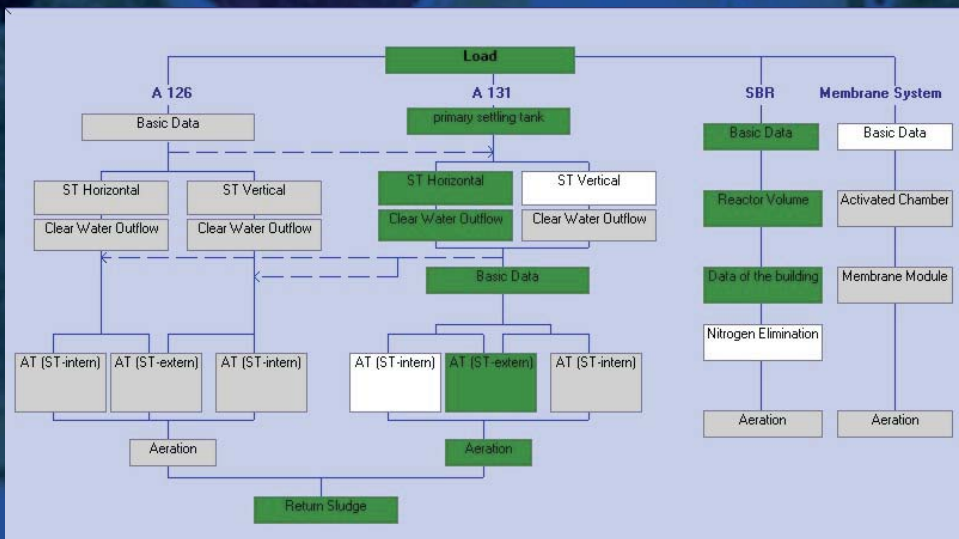




Software for Design of Wastewater Treatment Plants and Aeration Systems





AQUA DESIGNER: Design Software with Practice Oriented Tools

Inflow

Input of specific or absolute inflow data
Municipal and industrial inflow
Supernatant

Preliminary Treatment

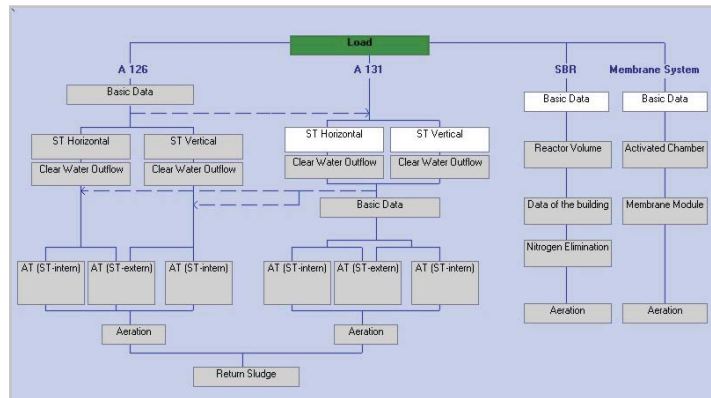
Aerated Grit- and Grease Chamber
Circular Grit Chamber
Primary Sedimentation

Biology

DWA-A131
DWA-M210
COD/BOD
Hochschulansatz
Chinese Design Regulations (in process)

Continuous Activated Sludge Process
SBR Sequencing Batch Reactor Process
MBR Membrane Activated Sludge Process
Anaerobic Chamber Selector

Extended Aeration
Separate Stage
Intermittend Denitrification
Simultaneous Denitrification
Cascaded Denitrification
P-Precipitation, Bio-P
External C-Dosage
Compressed Air Aeration
Surface/Mechanical Aeration
Vertical Axis Aerators
Horizontal Axis Aerators
Membrane Tubes



Simple Handling

The main level in AQUA DESIGNER leads you through the complete design process. The actual step of planning and the according design and engineering options are displayed.

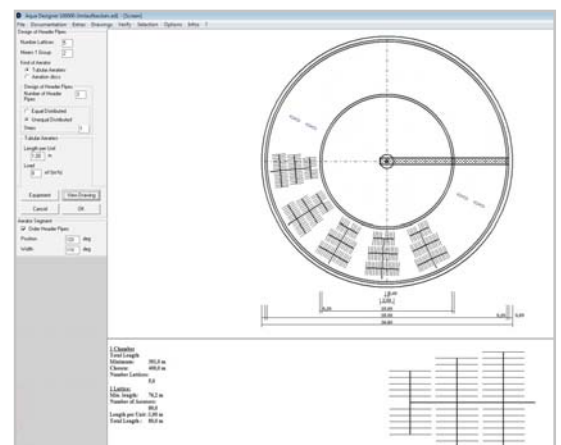


Chinese Design Guidelines

You can select the german/european or chinese guidelines. The chinese guidelines has been developed and implemented in collaboration with chinese experts and our partners. The functionality of AQUA DESIGNER has been fully adapted to the chinese regulations.

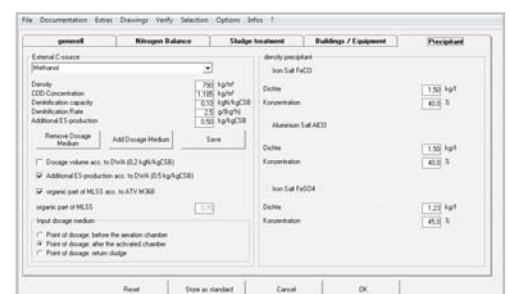
Design of the Aeration

True Scaled Drawings support you during the design of the Aeration System. Tubes and Discs and various constructions are available.



Parameter selection

AQUA DESIGNER is variable in the selection of parameters. So you can adapt the calculation basis to the conditions of your project. For standard conditions standard values are set.

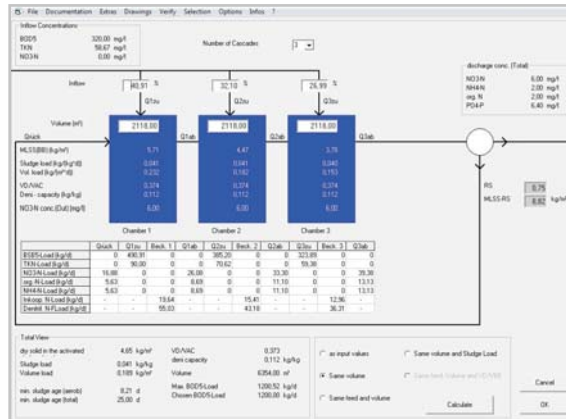


...from the Preliminary Treatment to the Sludge Treatment



Nitrogen Removal

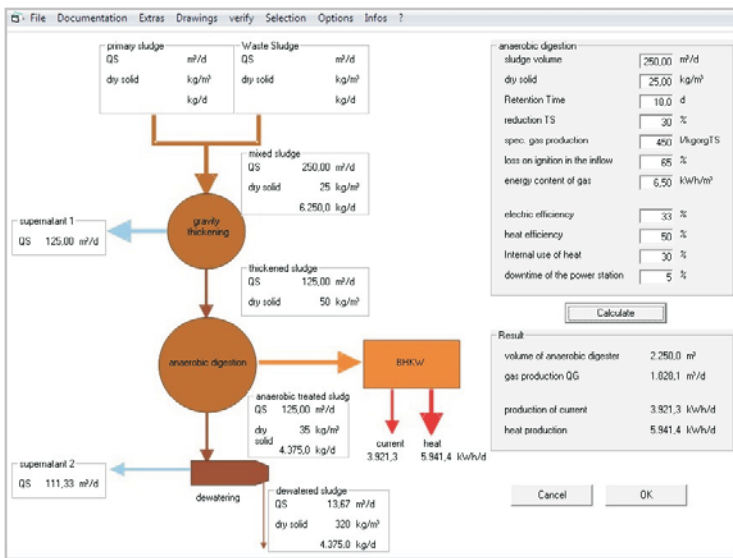
The different nitrogen removal processes can also be arranged and calculated as cascaded denitrification. After distributing the inflow to the cascaded chambers, you get detailed balances and design results.



- Activated Chamber as Combined Chamber
- Compact Chamber
- Circular Oxidation Ditch
- Rectangular Oxidation Ditch

Secondary Sedimentation as

- Circular Chamber
- Rectangular Chamber
- Hopper Tank
- Vertical / Horizontal



Sludge Treatment

- Thickener
- Digester
- Energy Balance
- Generator
- Balances
- Yield accord. EEG

Sludge Treatment

With AQUA DESIGNER you not only design the biological stage, but also preliminary treatment and sludge treatment. Sludge treatment includes thickener, digester with gas-, current- and heat-production. Loads and balances for supernatant and dry solids are also displayed and reported.

Data Banks and Equipment

- Blower
- Pumps
- Air Lift Pumps
- Mixer
- Scraper

Verification

- Activated Sludge Tank
- Secondary Sedimentation
- Aeration

Additional Options

- Multiline
- Express Calculation
- Changeable Parameters
- Load Variation

Operational Costs

Energy demand, consumables, precipitants, sludge removal. Energy production from the sludge treatment will also be taken in consideration.

	Anlagen-Wirkungsgrad	Förderhöhe	mittlere Fördermenge	Stromverbrauch
Rücklaufschlamm				
Schneckenpumpe	70 %	1,50 m	191,25 m³/h	9783 kWh/a
Primärschlamm				
Kreiselpumpe	60 %	5,00 m	1,46 m³/h	290 kWh/a
Überschussschlamm				
Kreiselpumpe	60 %	5,00 m	4,75 m³/h	945 kWh/a
Mischschlamm				
Exzenterpumpe	60 %	5,00 m	6,21 m³/h	1234 kWh/a
Eingedickter Schlamm				
Exzenterpumpe	60 %	5,00 m	1,68 m³/h	334 kWh/a
Trübwasser				
Kreiselpumpe	60 %	5,00 m	6,02 m³/h	1198 kWh/a
Sonstige Aggregate				
	Anzahl	Leistung	tägliche Laufzeit	Stromverbrauch
Mechanische Reinigungsstufe				
Vertikalenverdichter	1	1,90 kW	24,00 h/d	16,644 kWh/a
Druckluftbehälter	1	1,70 kW	0,02 h/d	12 kWh/a
Sandklassierer	1	0,25 kW	0,02 h/d	2 kWh/a
Kreiselpumpe	1	0,80 kW	0,29 h/d	85 kWh/a
Räumenarmb	1	1,20 kW	24,00 h/d	10,512 kWh/a
Vorklärung				
Rührer	1	1,50 kW	24,00 h/d	13,140 kWh/a
Biologische Stufe				
Druckluftgebläse	2	66,10 kW	11,71 h/d	565,043 kWh/a
Rührwerke	4	3,87 kW	24,00 h/d	135,605 kWh/a
Nachklärbecken				
Räumenarmb	1	1,00 kW	24,00 h/d	8,760 kWh/a
Schwamm-schlamm-pumpe	1	1,60 kW	2,00 h/d	1,168 kWh/a
Schlammbehandlung				
Kralbwerk	1	0,30 kW	24,00 h/d	2,609 kWh/a
Rührwerk	1	2,47 kW	24,00 h/d	21,599 kWh/a
Maschinelle Entwässerung	1	0,44 kW	24,00 h/d	3,860 kWh/a
Jährlicher Gesamtstromverbrauch:				792,823 kWh/a



Numerous Additional Functions and Detailed Documentation

Results

- Documentation of the Calculation
- Process Description
- Operational Costs
- Oxygen Efficiency
- Load Variation
- Sludge Level Grafics
- True Scaled Drawings
- Mass Calcualtion
- Bouyancy
- Sludge Balance
- Pipeline Diameters

Languages

- German
- English
- French
- Spanish
- Chinese
- Polish
- Hungary
- Tschech
- Bulgarian
- Kroatian
- Slowenian

Export Formats

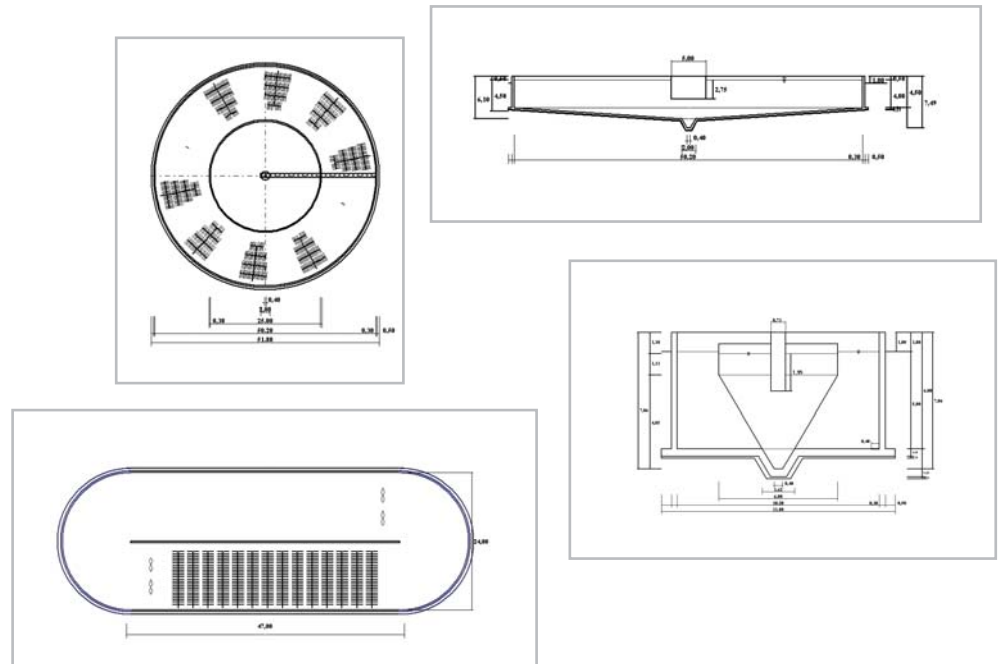
- Word
- Excel
- DXF
- Clipboard

Service

- Contextsensitive Help
- Manual
- Hotline

True Scaled Drawings

For all construction variants you can generate true scaled drawings. So the experienced engineer is able to prove the design. The drawing can be included into the documents or exported as dxf.



BIT/Chemie/Qualif. Klausurbeispiel Seite 1

2. Biologischer Stufe

2.1 Biobehälterklasse

Behältergröße auf anaerobischer Denitrifikation

2.1.1 Biobehälter-Typ

Die Biobehälter sind anaerobisch belüftet.

Abwasserleistung	q _{max}	q _{min}	q _{avg}
TKN-Konzentration	4000	1.000.000	200.000
TKN-Konzentration	1000	1.000.000	200.000
TKN-Konzentration	11.000	100.000	42.500
TKN-Konzentration	1.000	100.000	10.000

Flussaufwandsrate der Biobehälter

Reaktorleistung: $T = 12,00\text{ °C}$
 Sauerstoffkonzentration: $SP = 2,00\text{ mg/l}$
 Sauerstoffkonzentration: $STO = 2,00\text{ mg/l}$
 $RTS = SP \cdot (1,024^{T-20}) = 2,21\text{ g O}_2/\text{kg TS d}$

Parameter	Wert	Einheit
TKN-Konzentration	4000	mg/l
TKN-Konzentration	1000	mg/l
TKN-Konzentration	11.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l
TKN-Konzentration	1.000	mg/l

Verfahren (biologischer Prozess): $Y_{biol,TKN} = 0,80\text{ kg/kg}$
 Deaktivierungskoeffizient: $Y_{biol,TKN} = 0,200$

Osmotischer Druck: $RTS = 1 \cdot Y_{biol,TKN} = 11,272\text{ g}$

TKN-Konzentration: $TKN = 3,30\text{ kg/m}^3$
 TKN-Konzentration: $TKN = 1,17\text{ kg/m}^3$

Gesamte Bilanzierung

TKN im Abfall: $10,00\text{ mg/s}$
 TKN im Abfall: $2,00\text{ mg/s}$
 TKN im Abfall: $2,00\text{ mg/s}$

TKN im Abfall: $78,00\text{ mg/s}$

Parameter	Wert	Einheit
TKN im Abfall	10,00	mg/s
TKN im Abfall	2,00	mg/s
TKN im Abfall	2,00	mg/s
TKN im Abfall	78,00	mg/s

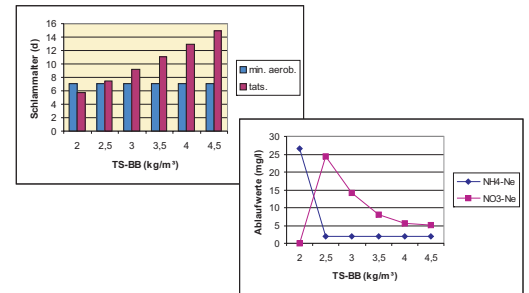
Belegte Aggregate

Parameter	Wert	Einheit	Einheit	Einheit
TKN im Abfall	10,00	mg/s	10,00	mg/s
TKN im Abfall	2,00	mg/s	2,00	mg/s
TKN im Abfall	2,00	mg/s	2,00	mg/s
TKN im Abfall	78,00	mg/s	78,00	mg/s

TKN im Abfall: $661,122\text{ kg/d}$
 TKN im Abfall: $611,45\text{ kg/d}$
 TKN im Abfall: $76,126\text{ kg/d}$

Extensive Documentation

You get detailed documentations in high quality format. All steps of calculations are documented with formulars, charts and graphics. It's possible to print directly with word, so you can edit the documents by yourself and include it in other documents.



Language Versions

All tools, documentations and reports are available in 11 languages. For example you can calculate in english or german and print in one or more of the other languages.

Economical Design of Aeration Systems with AQUA AERO

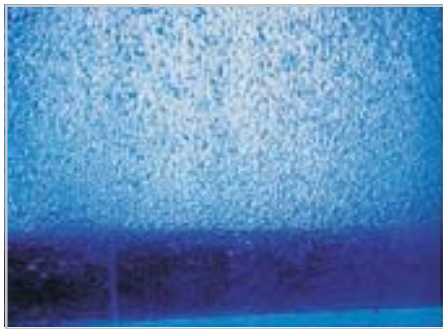


A new Quality in Planning Aeration Systems

AQUAAERO provides a unique range of functions for the design of the aeration in wastewater treatment plants. This means not only the design but also construction, pipelines, economic tools and project life cycle analysis.



AQUA AERO is Neutral. You can use AQUA AERO for the economic design of various aeration systems and you are able to compare them objectively.



Design of Aeration

The detailed design of the aeration is important for an economical operation, the supply for varying loads, a sufficient elimination efficiency and the evaluation of process and system variants. AQUAAERO enables you to define all details, considers the local conditions, product properties, variants of construction and all theoretical demands.

The screenshot shows the AQUA AERO software interface. On the left, there is a 'Datenbank' (Data Bank) table with columns for 'Index', 'Art', 'Fabrikat', 'Typ', and 'Gegendruck'. The table lists various aeration equipment models and their specifications. On the right, there are several input fields and calculation results, including 'Spezifische Sauerstoffleistung' (Specific Oxygen Transfer Rate) and 'Erforderliche Luftmenge' (Required Air Volume).

Index	Art	Fabrikat	Typ	Gegendruck
354	Drehkolbengebläse	GM 10 S	600	
457	Drehkolbengebläse	GM 25 S	600	
452	Drehkolbengebläse	GM 15 L	600	
435	Drehkolbengebläse	GM 10 S	600	
440	Drehkolbengebläse	GM 10 S	600	
400	Drehkolbengebläse	GM 15 L	600	
435	Drehkolbengebläse	GM 15 L	600	
452	Drehkolbengebläse	GM 35 S	600	
493	Drehkolbengebläse	GM 35 S	600	
650	Vertikal-Aerations	GM 60 S	600	
671	Drehkolbengebläse	GM 15 L	600	300,0
621	Drehkolbengebläse	GM 15 L	600	200,0
680	Drehkolbengebläse	GM 10 S	600	100,0
627	Drehkolbengebläse	GM 25 S	600	300,0
476	Drehkolbengebläse	GM 25 S	600	300,0
610	Drehkolbengebläse	GM 15 L	600	300,0
610	Drehkolbengebläse	GM 15 L	600	21,50

Data Base for Machines

Suitable blowers, pumps or mixers are provided out of a data bank. In the data bank you will find several manufacturers and a large basis of informations, like type, power, design information.

- Aeration System**
- Membrane Aeration
- Tubes
- Discs
- Plates
- Surface Aeration
- Mechanical Aeration (in process)
- Vertical Axis
- Horizontal Axis

- Chamber Design**
- Round Tank
- Ring Tank
- Rectangular Tank
- Oxidation Ditch

- Equipment**
- Rotary Piston Blower
- Side Channel Blower
- Turbo Compressors
- Gradation of Blowers
- Spare Blower
- Data Bank

- Mixer**
- Fast Rotation
- Slow Rotation
- Data Bank

- Data Bank**
- Blower
- Mixer
- Aeration Grids
- Pipelines
- Valves



Aeration Device

- Grids
- Distribution Pipes
- True Scaled Drawings
- DXF-Export

Pipelines

- Diameter
- Velocity
- Valves
- Costs

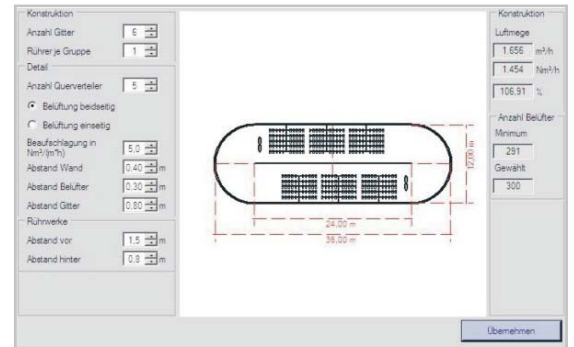
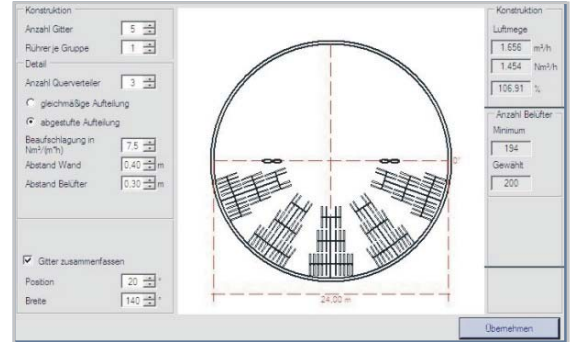
Export

- Word
- Clipboard
- DXF

Construction and Economy

Construction

You are very flexible in the design of the aeration devices, by changing the number of devices, distributors or placing them in the chamber. Grids can be collected in zones, in order to create aerated and unaerated areas in a chamber.



True Scaled Drawings

True scaled drawing are automatically created in a CAD-environment.

Economy of aeration systems

The oxygen input is responsible for about 75 % of the energy demand of a wastewater treatment plant. The economic design of the aeration system therefore is important for the efficiency of the whole plant. After designing an aeration system in AQUA AERO you can evaluate the invest- and operational costs. An important value for the operational cost is the oxygen efficiency.

AQUA AERO - Projekt Belüftung

Grunddaten Startparameter Sauerstoffbedarf σ_{OC}

Druckbelüftung | Oberflächenbelüftung

Rührwerk | Rührwerk

Belüfter

Rohrleitung

Sauerstofftragswert | Sauerstofftragswert

Investitionskosten | Investitionskosten

Betriebskosten | Betriebskosten

Projektkostenbarwert | Projektkostenbarwert

Projektkostenbarwert

Beobachtungszeitraum: 25.0 Jahre

Zinssatz real: 3.00 % p.a.

Preissteigerung (ohne Energie): 2.00 % p.a.

Preissteigerung Energie: 2.50 % p.a.

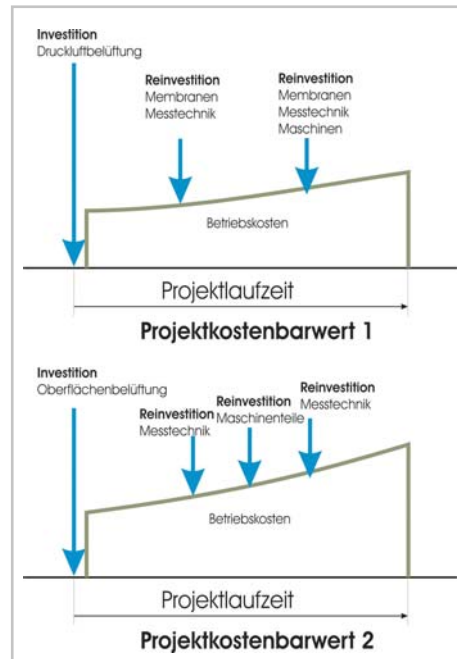
Nutzungsdauer	Bezeichnung	Investition	Nominale Reinvestition
25.0 Jahre	Planung	5.000,00 €	0,00 €
30.0 Jahre	Bau - Gebläseraum, Fundamente	3.450,00 €	0,00 €
20.0 Jahre	Bau - Erdarbeiten, Leitungsverlegung	1.000,00 €	0,00 €
20.0 Jahre	Elektronik	65.000,00 €	65.000,00 €
10.0 Jahre	Masstechnik	10.000,00 €	20.000,00 €
20.0 Jahre	Maschinentechnik 1	4,00 €	4,00 €
10.0 Jahre	Maschinentechnik 2	24.137,00 €	48.274,00 €
25.0 Jahre	Maschinentechnik 3	213,08 €	0,00 €

	Nominale Kosten	Barwert
Investitionskosten	0,00 €	0,00 €
Reinvestitionskosten	48.278,00 €	13.365,29 €
Laufende Kosten	0,00 €/Jahr	1.933.558,67 €
Projektkostenbarwert		1.946.924,95 €

Comparison of Aeration Systems

Comparison of Systems

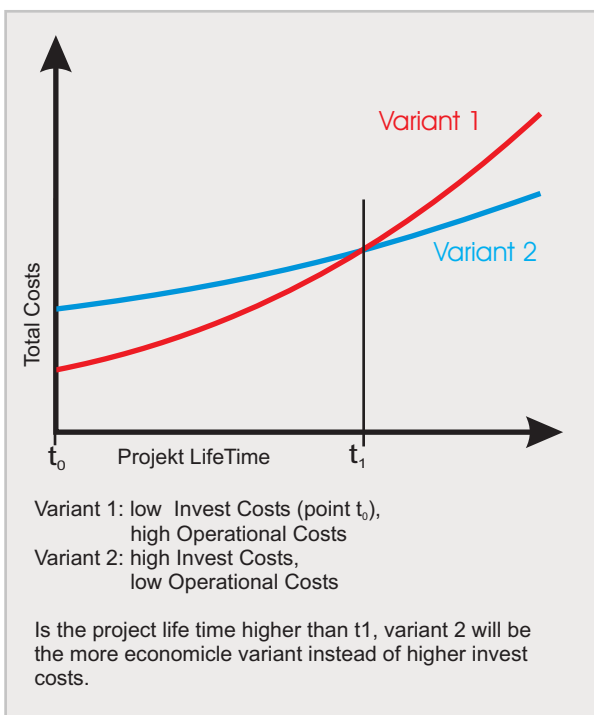
With invest-, reinvest- and operational costs AQUA AERO takes in account the full life cycle of an aeration project. This allows a real comparison of different systems. Characteristic for aeration systems is a high difference in invest and operational costs between different technologies. A simple comparison of the invest cost is not sufficient to find the suitable system.



With AQUAAERO it is easy to make a high quality and meaningful evaluation, by varying interest rates, reinvest times, project life time etc. It is not only possible to compare systems, but also to prove the effect of different manufacturers data.

Comparison of Concepts

Aeration systems are distinguished by very different invest and operational costs. A simple comparison of the invest costs is therefore not sufficient for a selection of the best variant.



With AQUAAERO it is easy to make meaningful comparisons, by varying interest rates, project life time, reinvest costs etc.. Therewith it is not only possible to compare



Activated Chamber as

- Combined Chamber
- Compact Chamber
- Circular Oxidation Ditch
- Rectangular Oxidation Ditch

Secondary Sedimentation as

- Circular Chamber
- Rectangular Chamber
- Hopper Tank
- Vertical / Horizontal

Sludge Treatment

- Thickener
- Digester
- Energy Balance
- Generator
- Balances
- Yield accord. EEG

Data Banks and

Equipment

- Blower
- Pumps
- Air Lift Pumps
- Mixer
- Scraper

Verification

- Activated Sludge Tank
- Secondary Sedimentation
- Aeration

Additional Options

- Multiline
- Express Calculation
- Changeable Parameters
- Load Variation

Service

AQUA DESIGNER is the powerful tool for the planning of wastewater treatment plants, incl. preliminary treatment, biological and sludge treatment. AQUA DESIGNER provides numerous results for presentation and approval, including buildings, machines, operational costs and true scaled drawings.

AQUA AERO is a special tool for the design of aeration systems. This tool is totally new developed, based on our experience with AQUA DESIGNER and our project works. Further to the design there are tools for validation of oeconomics like oxygen efficiency, total project costs or equivalent annual costs.

AQUA DESIGNER und AQUA AERO are continuously improved, extended and adapted to the state of the art and the actual guidelines.

Furthermore BITControl has a high qualified engineering support. We are collecting a lot of experience not only with our own projects but also out of the collaboration with our clients. So you get a high qualified support and practice oriented tools.

BITControl is more than Soft- and Hardware

We implement our experience in planning and operating wastewater treatment plants into our software products.

This will be reflected by our range of products:

- AQUA DESIGNER - Design of WWTPs
- AQUA AERO - Design, Engineering, Economic of Aeration Systems
- AQUA LOGIC - Fuzzy-Logic-Control
- AQUA PROVI - SCADA and Remote Control for water and wastewater
- BIO PROVI - SCADA and Remote Control for Biogas Plants
- BIO CONTROL - Controlling-Software for operating Biogas Plants
- PROVI ONLINE - Online-Portal for Plant Documentation at www.dieWartung.de

Our service doesn't end with the installation of the software. We accompany you with our experienced engineers and IT-specialists in questions of planning and operating your plants.

