ATAC Solutions Ltd is a leading environmental engineering company based in Maidstone, United Kingdom.

ATAC Solutions is known for its state-of-the-art liquid collection fleet and its expertise in providing bespoke turnkey wastewater process solutions.

With a focus on sustainability and accreditation in ISO 9001 & ISO 14001, the company serves domestic and industrial clients across the South-East and London.

ATAC Solutions Ltd,
Unit A9, Loc 8 Business Park, Ashford Road,
Hollingbourne, Maidstone, England, ME17 1WR

atacsolutions.com
01622 882400

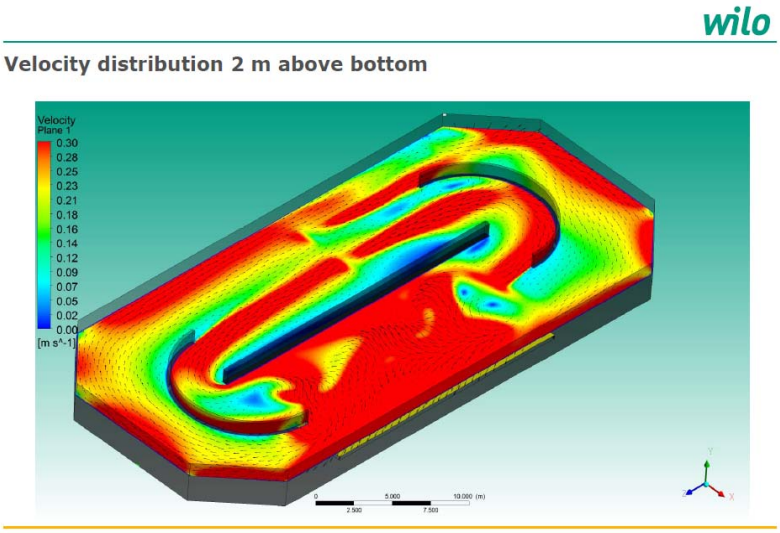
atac EDI EOSi Napier-Reid Nexom triplepoint
Axius Water companies

Experience

Experience in the design, manufacture, delivery and installation of Anoxic Mixers.

Attached the mixer case studies for your reference.
In the Uk Wilo has mostly worked with our Aeration Partner (Suprafilt) to supply complete packages of Aeration, Mixers and Installation.
Mostly this work has been carried out for Severn Trent on capital works, attached are the CFD and supply documents / case study for support.
In addition to this – Wilo is supplying circa £8.7m worth of mixers throughout Europe (see case studies, and sales figures below) (we have not included our USA/Asia Market figures)

In the Uk, Wilo has worked with the End user and contractor to assist at the design stage to ensure the best possible selections were employed – in the two samples attached for Severn Trent (Market Drayton & Welshpool – Sites) you can see that Wilo were able to reduce the energy consumption (in the case of Welshpool by just under 50%, Market Drayton 41%)

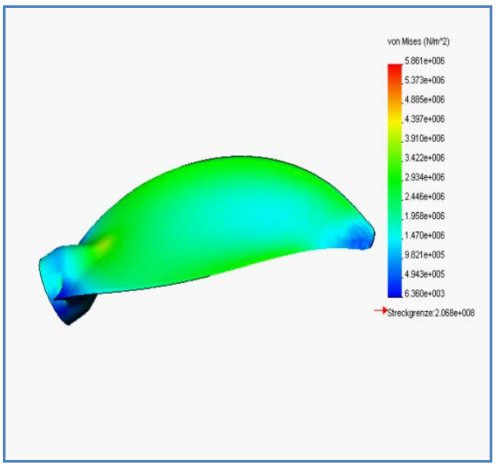


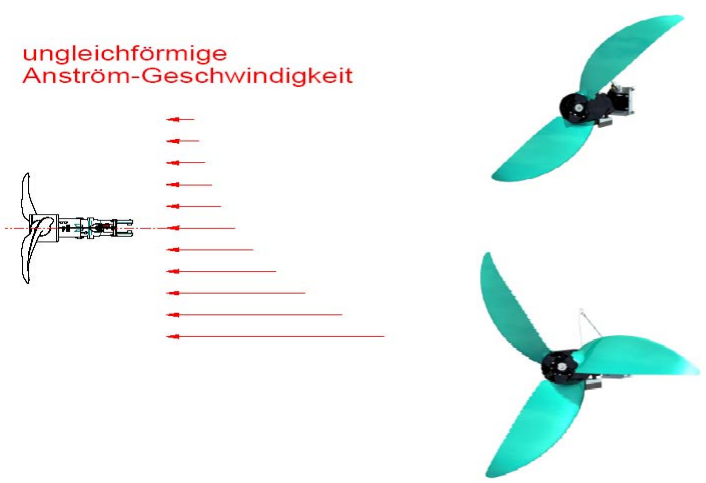
CFD for Market Drayton (Severn Trent).
We produce the CFD at varying increments from the floor to the surface, to demonstrate flow velocity, and identify potential dead area's, in order that the best possible selections are made, without trial and error.

This allows total optimisation of a system, in respect of installation, and ensures the best possible performance.
Samples are attached.

With the 100% in house design and manufacturing of all our mixers (Nuremburg) we are able to engineer product to suit requirements, while at the same time using a modular build system, we ensure standard components are utilised (ease of maintenance)

Wilo is a long established German engineering business, and draws upon these key strengths, with a long history of design and manufacture of pump equipment, Wilo is the premier Pump supplier in Germany, with a depth of experience within the field of Mixing.
To compliment this, Wilo Uk has a dedicated Mixing Engineer, who holds a Doctorate in science to support the strong technical ethics required by our business. The Uk competence team in this field is five people strong, with a design engineer, an application engineer, internal sales support/service and two field engineers for sales/site support.





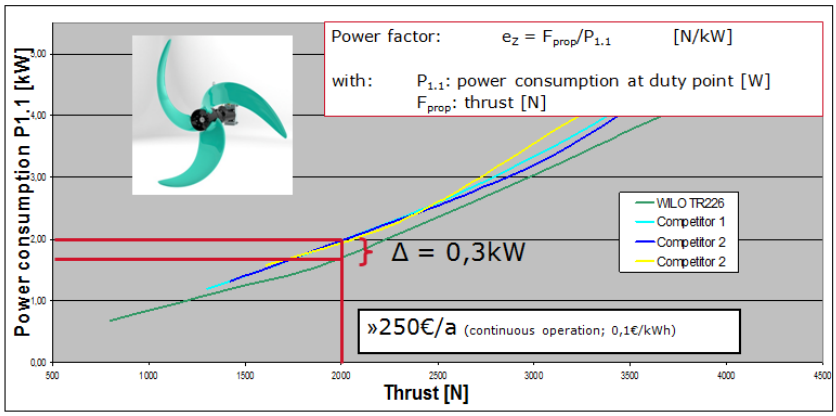
Approach velocity and osculation calculation to ensure the best blade profiles are employed.

2. High energy efficiency

To support our energy efficiency claims, please see the ISO verification (ISO21630), this cover the high thrust to power consumption ratio, and power consumption.
Wilo employs the use of IE3 efficiency motors as standard, and the use of rotary moulded carbon impellors with optimised pitch.
Wilo has pioneered the ultra low speed three blade mixer, to result in

- *Lower Specific Blade Loads*
- *Higher Tolerance to Unequal Flow*
- *Smoother Running*
- *Low Security Distance Requirements*
- *Higher total Thrust*

The independent ISO certification details the lowest power consumption across the entire range when compared main competition (see below – full calculation details attached in the ***LCC document****)*



In respect of Energy, Wilo manufacture in accordance with ISO 14064/1, this is the CEMARS certification, and currently have removed 32% of the embedded carbon from our products, operating at 1.3KwH/Hr of energy consumption for Mixers at present – each mixer can be supplied with an ISO Carbon certificate.

Make/type	Wilo-EMU Maxiprop (slow runner 2-blades old design)	Wilo-EMU Megaprop large propeller diameter (slow runner 3-blade new design) + IE3 motor
	TR 215.53-4/12	TRE 326.31-4/17
Propeller diameter	1,500 mm	2,600 mm
Thrust	2400 N/TR	2,330 N/TR
Power consumption in duty point $P_{1.1.}$	4.90 kW	2.00 kW
Performance coefficient	490 N/kW	1,165 N/kW

Energy Saving Example – of Old (traditional)Wilo Design) compared to the High Efficiency Design. The Traditional Design is comparable with standard market practice

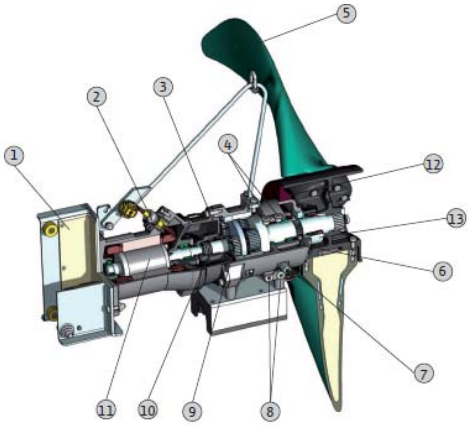
Calculation of savings in energy costs		
Difference in power consumption	4.90 kW – 2.00 kW	2.90 kW
Energy savings at four mixers per basin	2.90 kW × 4	11.60 kW
Annual operating time in hours	365 days × 24 hrs	8,760 hrs
Energy costs	0.15 €/kWh	
Energy cost savings per basin/year	8,760 hrs × 0.15 €/kWh × 11.60 kW	£ 15,242
Number of basins	4 basins	
Total energy cost savings per year	€ 15,242 × 4 basins	£ 60,967
Running time	10 years	
Total energy cost savings*	€ 60,967 × 10 years	£ 609,670
Calculation of payback time for extra investment costs		
Investment costs for four basins with four Wilo-EMU Maxiprop TR 215.53-4/12 each	16 × € 9,383	£ 150,128
Extra costs compared to Wilo-EMU Megaprop TRE 326.31-4/17	16 × € 1,368	£ 21,888
Energy savings per year	4 × € 15,242	£ 60,967
Payback time of extra costs**	Less than five months	

Save up to £ 609,670 on your energy costs.

* Energy costs calculated at a constant rate of 0.15 £/kWh.
** The payback calculation considers only the pure energy costs.

3. Materials of construction to be suitable for the highly corrosive activated sludge environment

Wilo employs a wide variety of materials in the design and construction of our Mixers. Below is the standard material selection:-



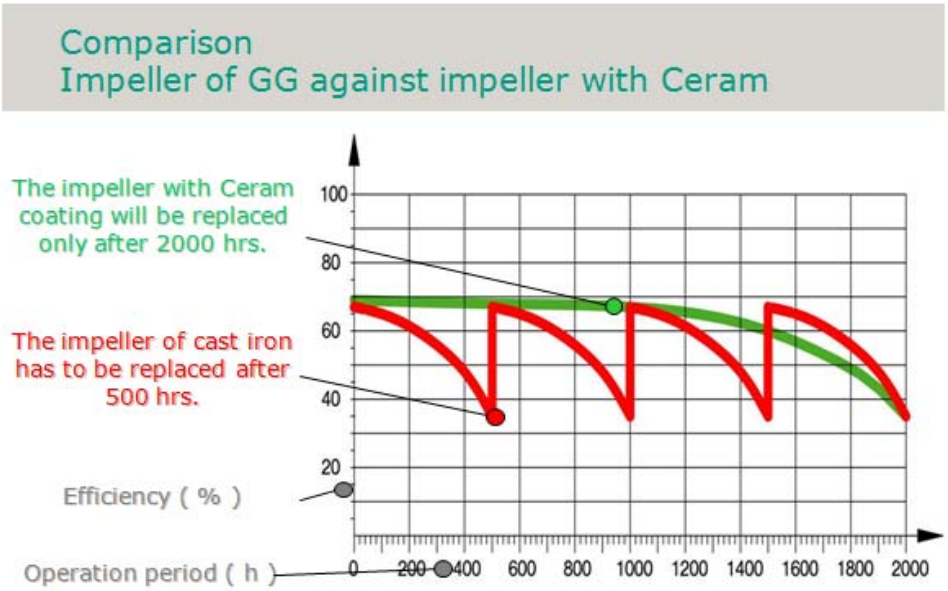
1 = frame, 2 = cable, 3 = gear chamber, 4 = oil filler plugs, 5 = propeller, 6 = prechamber, 7 = sealing chamber monitoring (optional), 8 = oil drain plugs, 9 = planetary gear, 10 = sealing chamber, 11 = motor, 12 = hub ring (optional), 13 = protecting ring

Materials	
Motor housing	EN-GJL-250
Motor shaft	1.4021
Gear housing	EN-GJL 250
Planetary gear	1.7131
Hollow gear	1.5216
Sun gear	1.7131
Drive shift	1.4462
Static seal	FPM
Sealing on pump side	SiC/SiC
Seal, gear chamber/prechamber	FPM
Seal, gear/sealing chamber	SiC/SiC
Sealing on motor side	FPM
Propeller	GfK Vinylester
Propeller hub	EN-GJL-400-15

Wilo can accommodate various material requirements from clients, bespoke manufacture is available upon request.

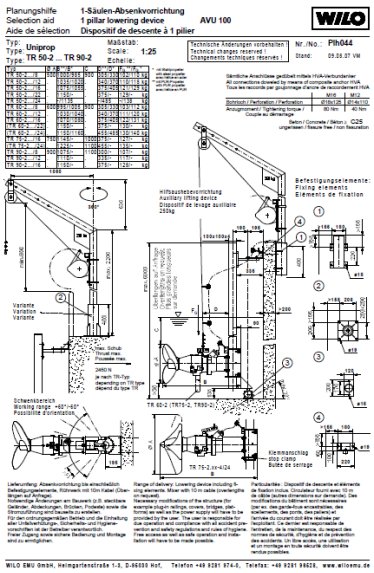
A very common material up-grade is the use of ceramics- especially on high speed mixers, mud mixers or highly corrosive/aggressive environments.
Wilo can bond surfaces with C0 on mixers for extreme corrosion resistance or C3 for extreme wear resistance – attached is a document cover Ceram.
Document : ***Ceram Protection.***

Below is an engineered example, to show a four fold (4x) wear resistance of Ceramic against standard GG20 (DIN 1693) ISO 185 tensile strength 200 N/mm2,min.



4. Equipment to be capable of being easily lifted, cleaned and maintained

Wilo can supply the installation devices for our mixers, or adaptors to most major mixer manufactures davits/hoists.



Continuous rolls which can be removed without tools
Or separate rolls (no cost options)

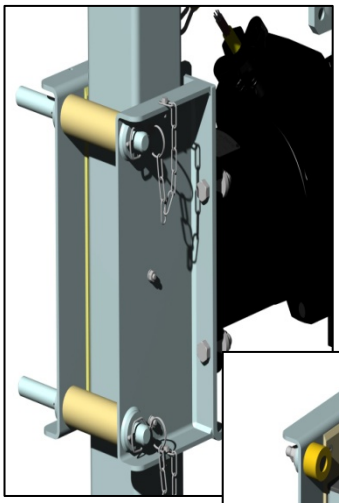
For application on different lowering devices of other manufacturers

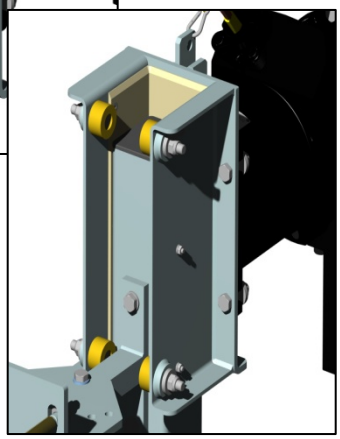
Increased stability

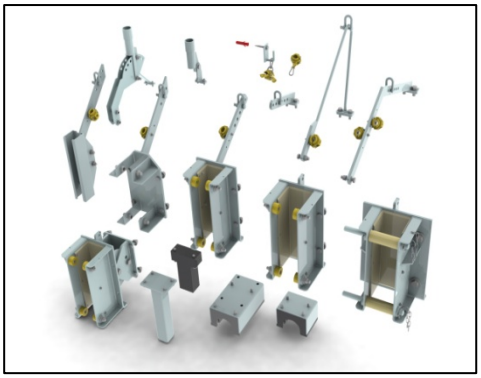
Material 1.4571

Simple separation of the submersible mixer from the guide pipe; free drawing without manual interferences

Lined with a sliding coat of PA







Accessories

From guide pipe over frame up to rubber buffers and supports – adaptation to the different applications without any problems.

Welded parts made of A4 (AISI 316) in standard design.

Auxiliary lifting devices
Different reaches in the qualities steel galvanized, V2A (AISI 304),V4A (AISI 316)

LGA-certified, exactly adapted to the Wilo submersible mixers regarding reach and load capacity

Lowering devices

Whether swivelling or stationary support, available in the qualities V2A (AISI 304), V4A (AISI 316)

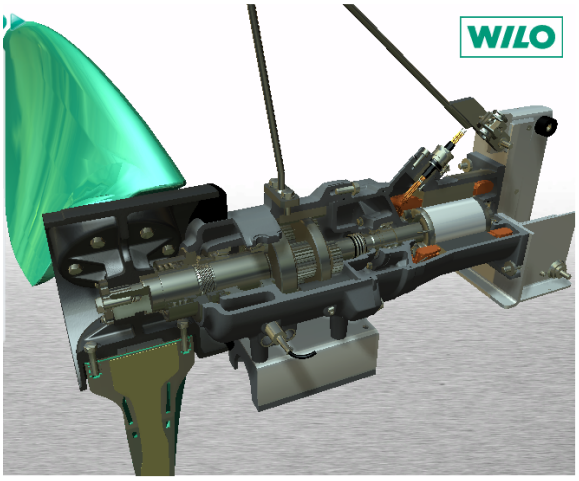
The Wilo product range includes lowering devices for each application.

Due to our flexible in-house production at the location Hof we are able to meet also special customer requests.

4. Equipment to be capable of being easily lifted, cleaned and maintained (Cont :-)

Wilo can supply all lifting devices to suit every application type, and posses an in – house design and manufacturing plant to custom manufacture to a bespoke requirement if required in either 304 or 316 stainless steel.

In respect of maintenance:-



The Wilo mixers employ a modular design from Stock components – this ensures ease of assemble and dismantle, they are designed to be Rewindable, and repairable, breaking into Three key sections

- *Hub*
- *Gear Box*
- *Motor*

Each of these items can be replaced individually.

Wilo worked extensively with the German Water Council, to ensure the repair companies could Easily dismantle and repair – and gain access To stock components locally (std Bearings/Seals/Insulation etc)

Wilo also offer a dedicated field service team on 24hour availability for both scheduled and un- scheduled site or workshop works, from simple service to complete overall and refurbishment.

We have worked extensively with our framework partners to ensure we support their existing infrastructure.

For example – at Welsh Water, the preferred repair business is "Arfon Rewinds", Wilo have now trained Arfon how to repair all of our product, select replacements, and ensured the training covered every aspect of our product.
We call these partner companies – Utility Partners, the aim of this "FREE" training, is to protect the integrity and quality of the Wilo Product, and enure our framework partners gain the easiest, most efficient service either locally from their preferred supplier, or direct with Wilo, of indeed themselves.

We run "FREE" training courses for all our partners, and have a dedicated training facility, with practical workshops.
We have worked for example with Wessex Water's delivery team, to ensure they can service our products in line with our own standards, and we design into all our products an assemble procedure to ensure "ALL" our clients can enjoy the easiest after sales service possible.

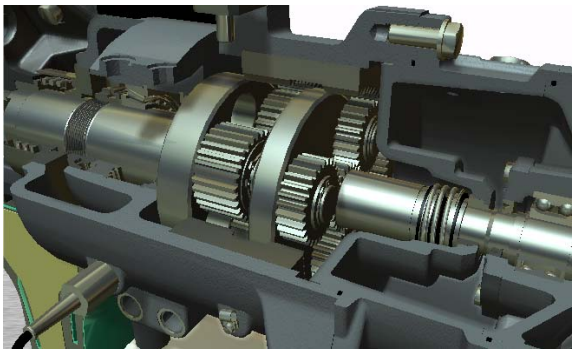
We can also agree to hold strategic stocks for key projects, in order to secure 100% supply targets.

5. Mixer/propeller blades to be designed to prevent fouling and ragging up. Features could include:-

Low propeller blade peripheral velocity (<5 m/s)

Wilo have pioneered super slow running mixers, using high efficiency planetary gearbox units, to ensure the blade velocities are as low as possible.

*Low Speeds from **13 Rpm***
Speed increments available in 0,1 to 0.2 rpm



By taking the power calculation for rotary Motion, its possible to see that for constant Torque, the reduction of speed will reduce the Power required in proportion

$$P = \frac{Nm \times rpm}{9550}$$

This means:-

$$Nm = \frac{9550 \times Kw}{Rpm}$$

Also taking the basic laws of rotary motion:-

Rotary Motion

$\omega = 2 \times \pi \times n$

$v = \omega \times r = 2\pi \times n \times r$

$\varphi = \omega \times t = 2\pi \times n \times r$

$a = \frac{\omega}{t_a}$

$M = F \times r$

$P = M \times \omega$

$M = J \times a$

$W = M \times \varphi$

$W = \frac{J \times \omega^2}{2}$

$J = m \times r^2$

This basic laws – or first principles, ensure that the balance between thrust (N) taken from the torque generated (Nm) can be applied to the blade loads.

Therefore – for exceptionally slow rotation – three blades can evenly distribute the load, while reducing oscillation forces, to reduce wear, fatigue and stress.

The bearings are fitted with the highest separation possible to ensure the highest spread of load, and the lowest bending moments at to the propeller hub.

This give bearing life <B10 in all selections.

6 Important Equations with numerical values for power transmission engineering

International System	Imperial System
6.1 Power	
Lifting motion	
$P = \frac{m \times g \times v}{\eta \times 1000}$	$P = \frac{W \times v}{\eta \times 33000}$
Linear motion	
$P = \frac{F_R \times v}{1000}$	$P = \frac{F_R \times v}{33000}$
$F_R = \mu \times m \times g$	$F_R = \mu \times W$
Rotary motion	
$P = \frac{M \times n}{9550}$	$N = \frac{M \times n}{5250}$
P – Power in kW	P – Power in hp
F_R – Frictional resistance in N	F_R – Frictional resistance in lbf
m – Mass in kg	W – Weight in lb
g – Accelaration of free fall (9.81 in m/s²)	
v – Velocity in m/s	v – Velocity in ft/min
η – Efficiency in decimals	η – Efficiency in decimals
μ – Coefficient of friction	μ – Coefficient of friction
M – Torque in Nm	M – Torque in lbf · ft
n – Rotational speed in 1/min or r/min	n – Rotational speed in rpm

$\frac{Q \times H \times P}{3.67 \times \eta \text{ total}} = kW$

Q=Flow – M³H
H = Head – Mtr
P = Fluid density
η total = η pump & η motor
η = Efficiency
kW = P2

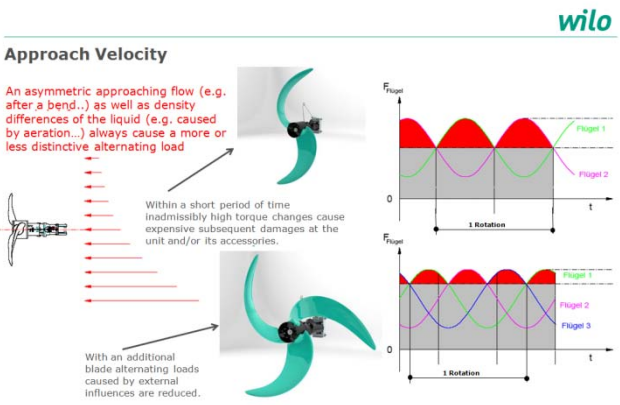
Efficiency

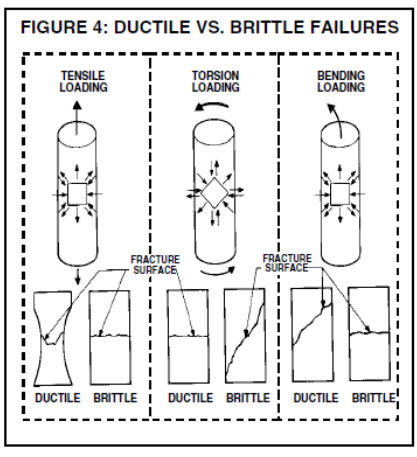
$\eta p = \frac{PH}{P2} \quad \eta m + \frac{P2}{P1}$

$\eta t = \eta p \times \eta m$

Head $\frac{(p2 - p1)}{(p \times g)} + (h2 - h1) + (V2^2 - V1^2) = H$

$(2 \times g)$



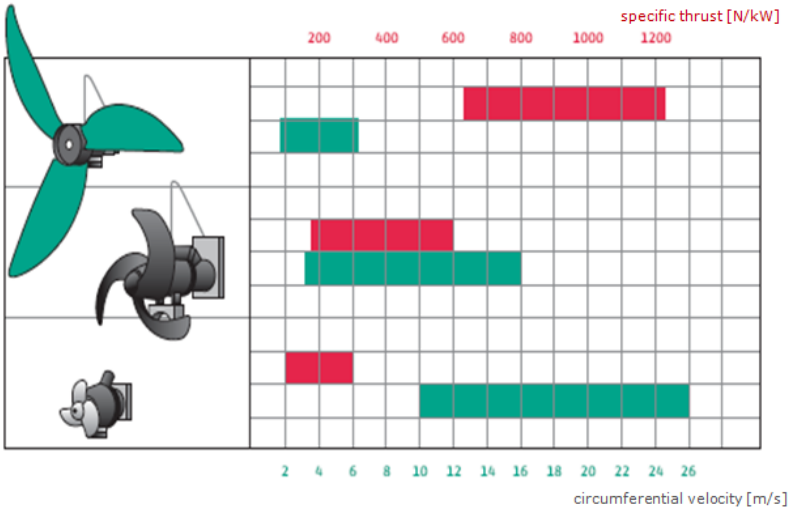


Low propeller blade peripheral velocity (<5 m/s) cont:-

Below is a brief overview of Wilo Mixers.
The Green block shows circumferential velocities scaled along the bottom (in green)
The Red Block shows Specific Thrust scaled along the top (in red)

Classification of the Submersible Mixers

- **Slow speed submersible mixers**
  - Propeller speed: 13 - 158 min^{-1}
  - Propeller diameter: 1,2 – 2,6 m
- **Medium speed submersible mixers**
  - Propeller speed: 150 – 500 min^{-1}
  - Propeller diameter: 0,5 – 1,2 m
- **Direct driven submersible mixers**
  - Propeller speed: 700 – 1450 min^{-1}
  - Propeller diameter: 0,14 – 0,4 m



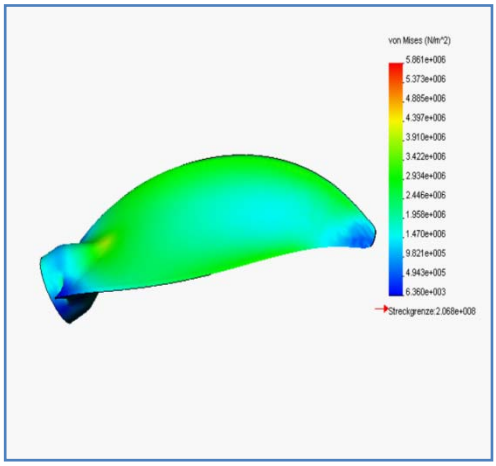
The volume manufacture of Wilo low speed mixers starts at 13 rpm, with propeller sizes at 1.2mtr, this equates to a circumferential velocity of 1.6m/s
With the fastest possible combination giving – 6.2 m/s

Over 95% of possible combination fall below 5m/s,

75% of selections falling between 2.4m/s and 4.1m/s.

Even the Medium Speed mixers with speeds of 150rpm to 500 rpm can offer circumferential velocities below 5 M/S on 18.2% of all possible selections

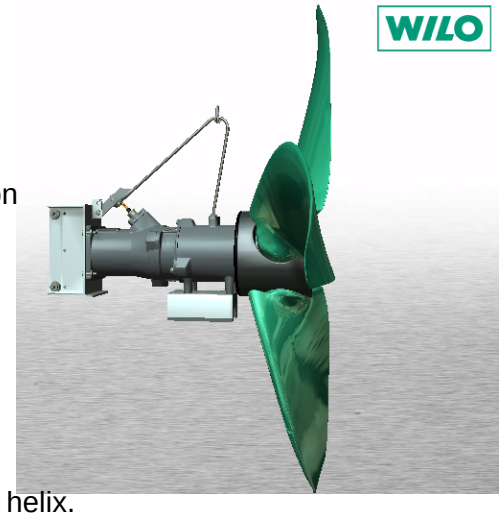
Smooth propeller shape avoiding volute inserts



Low Speed blades are manufactured in one
Piece (no bonding)
They are produced in Gfk Vinylester.

This woven carbon and polyester / Vinyl combination
Allows for superior
Fatigue Resistance
Wear Resistance
Load Profiling
Hydro-Dynamic Modelling
Custom Manufacture
Single Piece Design

The lack of bonding / jointing ensures no separation
Due to wear or adhesive failure.



The Hydrodynamic Modelling ensure even
Load distribution, and high wear area's are designed
To handle wear (blue area) this in turn allows the evolution
Of blades with superior life expectancy, wear resistance
And of course highly efficient energy transfer
The blade profiling and manufacture has been one
Of the key development area's that allowed Wilo to
Produce high thrust / flow, from ultra low speed, and in
Turn world class efficiency.

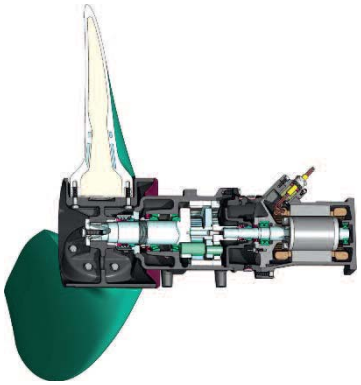
- High pitch angles
- High Pressure Differential (Front/Rear) – cleaning helix.
- Low Specific Blade Loads
- Fixed blade angles (hub fix)
- Extreme Rigidity values
- Good Flexibility to absorb impact
- Low Weight – reduces inertia, and low FI factor for high safety factor
- High Energy Transfer
- Increased Safety Factor
- Improved "Truth" of Rotation
- Protection Sleeve on Seal (Protects against blockage/fouling)

Wilo high pressure differential blades ensure the reverse blade is reverse curved, to generate the maximum fluid velocity differential across the flow surfaces, to ensure a minimum amount of clogging.
This maximises the anti clogging security.

Also – for abrasive environments, the high wear area's can be
Engineered to suit for maximum wear resistance – with the application of
Woven material combinations.

Smooth propeller shape avoiding volute inserts (Cont)

One piece Hub and Impeller designs are also available - mainly popular for smaller diameters (due to transport etc)



The patented, advanced moulding process
Used to produce the mixers blades, ensures
The extreme high securities in operation.
Irrespective of three blades, two blades
One piece hub and blade.

Also available for consideration is the
Specially manufactured Mud Mixers.
These units are mostly used in industrial
Applications, to mix very high solid contents,
These employ specially developed materials
To resist the extreme wear.

Wilo offer best in class blade design and
efficiency, and have a proven track record
In the most difficult environments, of high
performance, and reliability.

Below – a variety of blade designs, three blade, two blade, and one piece blade/hub.