



TARTLER SYSTEM SOLUTIONS

Dosing and mixing technology for the windindustry

Gel coating / Vacuum infusion / Blade bonding / Finishing / Balancing applications



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PRESS RELEASE 02/2021

Bild: freepik.com

Wind Energy / Plastics Technology / Adhesive Bonding Technology / Surface Technology / Dosing and Mixing Technology

RAISING THE LEVEL OF AUTOMATION AND QUALITY

TARTLER's synthetic resin systems set standards in rotor blade production

Around the globe, TARTLER's dosing, mixing and degassing systems contribute to the efficient production of modern wind turbine rotor blades. They are used in all relevant process stages: from the construction of molds to the production of half-shells and their bonding to the finishing of blade surfaces. They support automation, ensure optimum use of materials and increase safety when handling synthetic resins. Read here which TARTLER plants and system solutions are primarily used in the wind power industry today.

se tasks. Not only the dosing and mixing machines of the Nodopur, Nodopox and Tardosil series can now be found in numerous rotor blade manufacturing plants, the innovative T-EVAC degassing station for infusion resins and TARTLER's vacuum barrel changer, for which a patent has now been filed, are also enjoying increasing demand. Thanks to the reprocessing of pure residual quantities, a significant reduction in waste can be achieved. "Often, our solutions enable manufacturers

Michelstadt, February 2021. – Modified polyurethanes, epoxy resins and flexible glass fiber products are key materials in the design and production of modern wind power rotor blades for onshore and offshore turbines worldwide. They are not only used for the application of tooling pastes and EP resins during the construction of large molds and models, as well as for the production of the two blade half-shells and their bonding, but also for the application of weatherproof surface layers as well as leveling compounds and numerous finishing operations. Numerous well-known manufacturers in the wind energy sector, such as TPI or Vestas, rely on the modular system solutions of the German plant manufacturer TARTLER to carry out the-



Ready for the vacuum infusion: Large Nodopur plant from TARTLER with integrated degassing unit for processing low-viscosity epoxy or polyurethane resins and hardeners in rotor blade production.

to implement key process optimization and automation measures. In addition, they support the loss-free use of materials and increase safety standards when transferring the synthetic resin components from the material suppliers' containers," says company boss Udo Tartler.

Priming and balancing

Many rotor blade producers apply the gel coatings to the inner surfaces of the cavities using TARTLER's Nodopur or Tardosil 2-component dosing and mixing systems. With these systems, the primers of silica and thickened synthetic resins, which primarily serve to mechanically protect the surfaces and seal them against moisture, can be applied very homogeneously and quickly. This is ensured, among other things, by integrated volume flow controls with which mixing ratios and output quantities can be automatically adjusted. Both systems are controlled by PLC from Siemens, are suitable for different dosing ratios and can be operated with different mixing heads from the TARTLER range. As their name suggests, the Nodopur machines are predestined for processing polyurethane and epoxy resins, while the Tardosil machines are also designed for silicones. "Both series are also used when precisely metered leveling compounds are introduced into the rotor blades for balancing," adds Udo Tartler.

Vacuum infusion and material degassing

For vacuum direct infusion – the patent-pending method for turbine blade production developed by TARTLER – the two-component dosing and mixing system



Large TARTLER Tardosil plant with boom for gel coating molds in rotor blade production.

Nodopur is widely used. It can eject up to 30 liters per minute, has an automatic vacuum refill unit and a Siemens PLC with touch screen. TARTLER offers a variety of different mixing heads for this plant variant as well as the option of equipping it with a swiveling boom to optimize handling. In addition, this infusion system – like many other machines from the company – can be combined with the T-EVAC vacuum degassing station. "This station is used for the process-integrated and safe evacuation of air and moisture from the synthetic resins and hardeners, prior to dosing and mixing," emphasizes Udo Tartler.

Bonding and finishing

After both blade half-shells have been shaped by vacuum infusion, they are glued together to form the finished rotor blade. For years, the TARTLER systems of the established Nodopox series, designed for the processing and application of highly viscous, paste-like plastics,



"With our dosing and mixing equipment and vacuum degassing stations, we enable rotor blade manufacturers to implement important process optimization and automation measures."

TARTLER GROUP Company boss
Udo Tartler



Drum changing system TAVA D in a Nodopox: A vacuum (-0.97 bar) is created in the drum so that no air can enter the dosing and mixing system when the drum is changed. Material loss and splash hazards are virtually eliminated.



Nodopox system from TARTLER for the processing and application of paste-like plastics for the bonding of rotor blade half-shells.

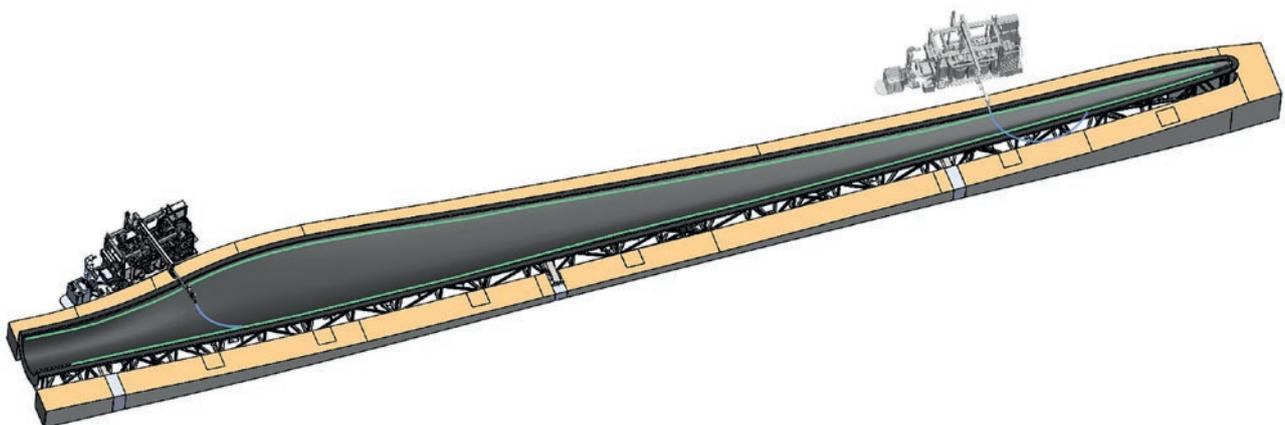
have been widely used in the industry. For some time now, new standards have been set here by a Nodopox variant equipped with the integrated vacuum-assisted drum changing system TAVA D for waste reduction and a swiveling mixing head boom with a 5-metre radius (optional). This plant is also equipped with a Siemens PLC with touch screen and a volume flow control. It can work with different TARTLER mixing heads and dispenses up to 20 kilograms of adhesive per minute.

Another typical TARTLER „gluing system“ is the Nodopox, whose equipment is adapted to so-called lightning and insert applications in rotor blade production. Udo Tartler explains: “Adhesives are used that have to be metered, mixed and applied in smaller quantities – for example, for fastening lightning conductors or inserting inserts for screw mounting complete blades. These systems are operated both manually and in combination with robots and handling units. Finally, when it comes to filling and smoothing the adhesive edges,

it is once again the Tardosil mentioned above that allows the putty used for this purpose to be precisely and quickly dosed, mixed and applied. In this case, too, TARTLER offers its customers numerous options for application-specific adaptation. The large assortment of modules offers a lot of freedom for optimal, application-specific customization of the systems.

Individual fine tuning

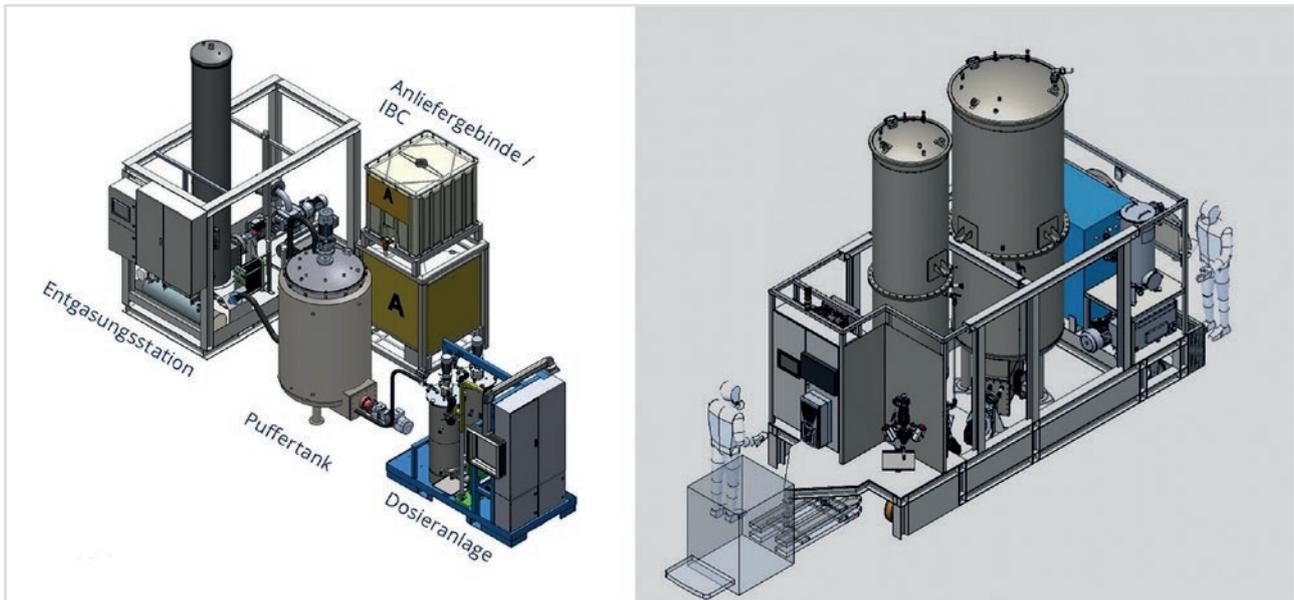
Since TARTLER is able to adapt all systems very precisely to the specific requirements and on-site situation of the customer, they fit seamlessly into the customer’s production environment as tailor-made system solutions. They are often an important performance factor in the increasingly automated processes of modern rotor blade production lines. “Since we provide manufacturers with several innovative interface solutions at the same time with our vacuum-assisted drum changing



The Nodopox system from TARTLER has a mobile design and is driven along the rotor blade half shells by its own drive unit when applying the pasty adhesives.

system TAVA D and the vacuum filling station TAVA F as well as the liquid resin evacuation system T-EVAC in the offline and inline variants, we open up many additional

possibilities for process optimization and increased efficiency in the processing and application of synthetic resins," says Udo Tartler.



The T-EVAC degassing system can be integrated into dosing and mixing systems (right) or operated offline by connecting a buffer tank upstream. The offline variant shown here (left) has an external buffer tank; alternatively, the tank can also be installed in the processing plant.

TARTLER FOR WIND POWER – IN A NUTSHELL

NODOPUR SERIES

For low viscosity epoxy or polyurethane resins and hardeners for vacuum infusion and gel coating of rotor blades.

NODOPOX SERIES

For high viscosity epoxy pastes and hardeners for bonding blade half shells.

TARDOSIL SERIES

For mixing high viscosity epoxy and PU resins with low viscosity hardeners for gel coating as well as for finishing and balancing applications.

All systems are modular in design and are configured according to project and customer specifications.

Note for editors: Text and pictures are available at www.pr-box.de/



More Information about TARTLER's machine series and degassing systems can be found on our website.

- ▶ www.tartler.com/en
- ▶ www.tartler.com/en/products/vacuum-degassing-station-t-evac
- ▶ www.tartler.com/en/products/tava-f
- ▶ drumchange.tartler.com

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PRESS RELEASE 03/2021

Wind Power/ Plastics Technology/ Environmental Technology/ Process Optimization/ Dosing and Mixing Technology

MORE SUSTAINABILITY IN ROTOR BLADE PRODUCTION

Vacuum filling system from TARTLER GROUP reduces waste and optimizes the use of consumables

TARTLER GROUP's vacuum-based degassing station TAVA 200 F is widely regarded as a groundbreaking solution for the sustainable and resource-saving use of liquid and pasty media. The evacuation system enables waste-free and safe filling and transfer processes, particularly in plants that process large quantities of high- and low-viscosity fluids. With this system, for example, a well-known manufacturer of wind turbine rotor blades saves many thousands of kilograms of synthetic resin per year in just one of its plants. The upshot: a considerable reduction in material costs and significant improvement in the environmental balance.

Michelstadt, March 2021. – In the production of rotor blades for wind turbines, large quantities of synthetic resins are used for the bonding of the up to 85-meter-long blade shells alone. For almost three decades, TARTLER GROUP has been equipping well-known manufacturers in the industry with the modular multi-component systems of its Nodopox series for the largely automated dosing, mixing and application of mostly high viscosity pastes. Six years ago, the company started developing vacuum-based degassing stations that enabled rotor blade producers to make their synthetic resin processing much more material- and cost-efficient. The new TAVA 200 F vacuum systems are now setting technological standards in terms of sustainable process optimization. This is because the complete, bubble-free filling and transfer of the synthetic resins into lidded drums paves the way for safe material handling and the implementation of resource-saving and cost-effective preparation and recycling processes.

Degassing station reduces material loss

For a long time, a constant source of annoyance in rotor blade production was that large quantities of homogeneous resin residues – from opened drums or from the preparation phase – could not be reused or recycled. They had to be removed and disposed of, which had a negative impact on costs and ran counter to all approa-



The TAVA 200 F evacuation system from TARTLER GROUP enables the implementation of waste-free and safe filling and transfer processes, especially for companies that process larger quantities of high- and low-viscosity synthetic resins.

ches to the sustainable use of materials. Several on-site analyses by TARTLER engineers revealed, for example, that even when drums were emptied properly and in accordance with the operating instructions, up to 14 kg of material still remained in the liners – clearly visible after drum changes in the dosing and mixing systems. What’s more, testing and quality controls lead to several kilograms of leftover material – per rotor blade. Added to that, residual quantities from flushing, surpluses and other ancillary work also create waste. Until now, however, it has not been possible to simply return the residual material produced at the various points to the production process. The reason: Air pockets, air bubbles and moisture are created when filling the lidded drums. If this „disturbing air“ were to enter the pump of the dosing and mixing system during removal, transfer and dosing of the material, the manufacturing process would be massively disrupted. Process interruptions would be required to flush the complete system (several times) with material for it to work air-free and properly again. All this would lead to considerable material losses and further costs, since prefabricated components would have to be restored and upstream processes would have to be cleaned at great expense.

Returning material residues

With the TAVA 200 F degassing station, the TARTLER GROUP offers a way out of this dilemma. With this system, both liquid and paste-like residues can be filled into lidded drums without „disturbing air“ and then safely reintroduced into the processing cycle with minimal loss. Significant savings in material purchasing can be achieved in this way. By using the TAVA 200 F, a leading wind turbine manufacturer was recently able to reduce its synthetic resin consumption by approx. 28 tonnes of synthetic resin paste per year, thus consider-

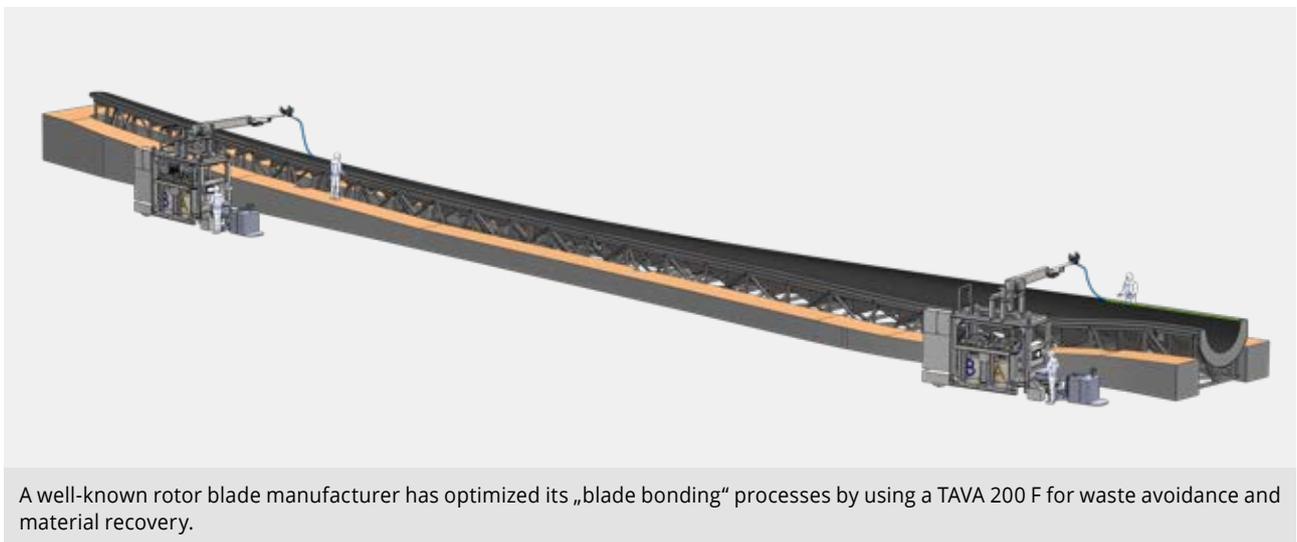


The TAVA 200 F degassing station from TARTLER GROUP consists of a device for clamping and stabilizing the drum, a combination attachment for synchronized vacuum generation and filling, a vacuum pump and a control unit with touch screen.

rably reducing the overall costs in its rotor blade production. In this way, the system also counteracts waste and makes a considerable contribution to the conservation of resources. It also improves the environmental balance of the company’s value chain and reduces its ecological footprint.

Process integrated circuit

The rotor blade manufacturer in question optimized the blade bonding process by integrating a TAVA 200 F into its synthetic resin processing resin processing. Here the collected material residues are filled and de-



A well-known rotor blade manufacturer has optimized its „blade bonding“ processes by using a TAVA 200 F for waste avoidance and material recovery.



Even when drums are emptied properly, up to 14 kg of synthetic resin residues remain in the liner. The TAVA 200 F from TARTLER GROUP allows these to be processed and fed back into the rotor blade production process.



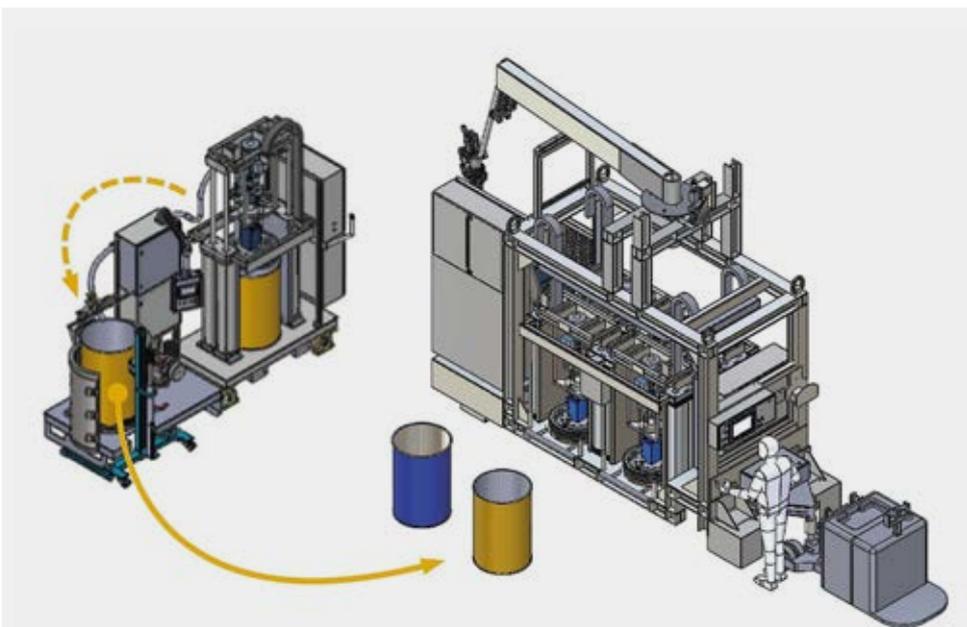
Used by many robot blade manufacturers: The dosing, mixing and application system Nodopox 200 VS AR 2K from TARTLER.

canted into standard clamping lid drums, degassed and freed from any interfering air. Once a drum is completely filled with reconditioned material, it can be used again in a 2K Nodopox system (or similar machine) for dosing, mixing and applying the synthetic resin adhesive. In this way, the manufacturer can reuse almost all homogeneous material residues. According to TARTLER's calculations, the return on investment can be achieved after less than 24 months. Positive side effect: As the amount of waste decreases, the costs of disposal are also reduced.

Airfree on YouTube

The TAVA 200 F is configured and delivered by SOMATA, a subsidiary of the TARTLER GROUP. The degassing station is offered as standard for the air-free filling and transfer of 200- and 50-liter drums, but can also be adapted to other container sizes on request. It consists of a device for clamping and stabilizing the drum, a special combination attachment for synchronized vacuum generation and filling, a vacuum pump and a control system with touch screen. All components are installed

on a base with a drum centering plate and are accessible from all sides. While the loading of the station, positioning of empty drum and closing of the clamping device can be done manually, the evacuation of the drum and almost simultaneous filling of the material are fully automated. After a few minutes, a drum is filled without air and is ready for use in production. This process is clearly illustrated in a [video on the SOMATA YouTube channel](#).



Internal material cycle: Once a drum in the TAVA 200 F is completely filled with reconditioned material, it can be used again in a 2K Nodopox system (or any other dosing system) for dosing, mixing and applying the synthetic resin adhesive.



SAFE AND RESOURCE-SAVING PROCESSES

In addition to the TAVA 200 F, offers the TARTLER GROUP three further system solutions for the degassing of high and low viscosity materials. These are the drum changing system TAVA D and the evacuation system T-EVAC in their offline and in-line configuration. They are all based on vacuum technology and are used to remove interfering air

and moisture in the handling of pasty and low-viscosity media – both during filling and feeding into the processing plant. As shown by the example of the TAVA 200 F, the systems can also be used for production-integrated reconditioning of material residues, for targeted waste reduction and for the realization of internal material cycles.

Note for editors: Text and pictures are available at www.pr-box.de/



More Information about TARTLER's machine series and degassing systems can be found on our website.

- ▶ www.tartler.com/en/products/tava-f
- ▶ www.tartler.com/en/vacuum-degassing-station-t-evac
- ▶ drumchange.tartler.com
- ▶ www.somata-gmbh.com/en

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SOMATA



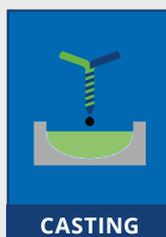
TAVA 200

VACUUM DRUM



The Vacuum Drum works like a vacuum chamber and is a ready-to-install module for integration in filling systems as well as for vacuum drum change in dosing systems.

for 200 l drums



TAVA 200

VACUUM DRUM

With the use of our vacuum drum, we offer a pioneering solution for the material-optimized and cost-reduced handling of liquid and paste-like media. Developed and patented by the TARTLER GROUP, it is used to prevent air inclusions during material filling, to return material residues to the production process and to make the drum change of 200-liter lidded barrels absolutely reliable in terms of work and process.



Material filling under vacuum (TAVA F)

- ▶ For drum filling without air pockets at the material manufacturer (degassing station)
- ▶ For waste reduction and recycling of unmixed material residues into the production process (preparation station)
- ▶ For waste reduction and recycling of unmixed material residues into the production process (preparation station)

Benefits of drums filled without air

- ▶ Guarantee that the optimally filled drums don't contain any air inclusions and that further processing is reliable
- ▶ Increased storage stability, as contamination with air/humidity is no longer possible
- ▶ Waste avoidance, as unmixed material residues can be collected and degassed for reuse



Process-reliable drum change (TAVA D)

- ▶ Easy and safe change of component drums without the risk of introducing harmful air into the system or process
- ▶ Fully automated degassing or evacuation station with vacuum drum for taking up, pumping off and venting the lidded drums

Benefits of using the TAVA D means

- ▶ No air introduction into the dosing and mixing unit during routine drum change
- ▶ No risk of splashing (no contamination of the operator with material)
- ▶ No material loss
- ▶ No monitoring / permanent presence of the operator necessary
- ▶ Any remaining material in the inliner can be added without affecting the material in the following drum



Application and info videos can be found on our international YouTube channel:
www.somata-gmbh.com/social-media

TECHNICAL DATA

Vacuum pump	25 m ³ /h, ultimate pressure 0.1 mbar
Tank	200 l drum (possible with and without Inliner)
Equipment	<ul style="list-style-type: none">▶ vacuum drum with cover▶ connection for material supply▶ sight glass▶ level control
Optional additional equipment	<ul style="list-style-type: none">▶ Colour of the drum on customer request / VA▶ Drum lifter▶ Scale▶ further special equipment possible

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Design example with buffer tank

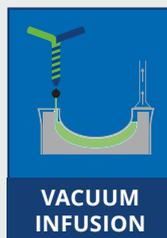
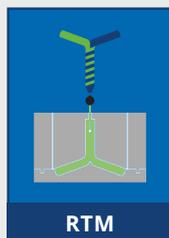
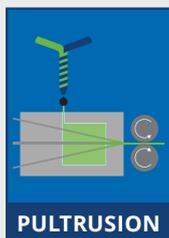


T-EVAC

VACUUM DEGASSING UNIT

Process-integrated vacuum evacuation of air and moisture from synthetic resin and hardener before metering and mixing

Degassing capacity up to 1000 litres/hr.



T-EVAC

VACUUM DEGASSING UNIT

WHY DEGAS?

- ▶ Air and moisture that affect quality are removed from the resin
- ▶ improved manufacturing process
- ▶ improved product quality

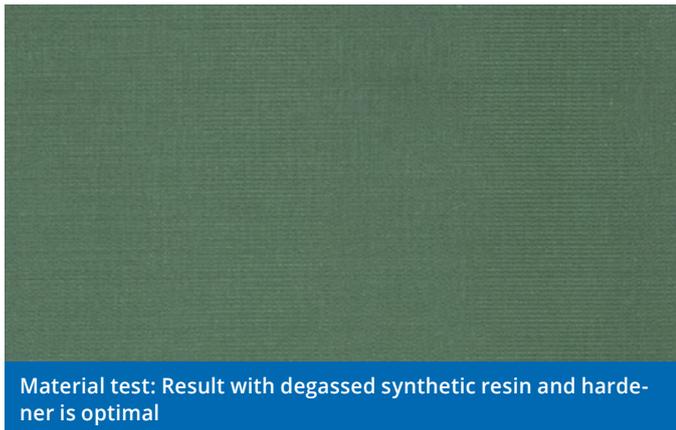
We present: the vacuum degassing unit T-EVAC for the process-integrated evacuation of air and moisture from synthetic resins and hardeners before dosing and mixing.

Thus we offer to all users who use the methods of vacuum infusion, wet moulding, resin transfer moulding (RTM) and pultrusion another means of decisively improving both their moulding processes and their product quality. The new degassing unit is suitable for epoxy resin and polyurethane resin degassing. The system solution design comes in two versions: in the form of offline degassing at a central point, from where you can fill the tanks of multiple dosing systems with degassed material. The second version comes as inline degassing, directly integrated into the dosing system and tailored to the process requirements.

The outstanding degassing quality is measurable and has already been verified in test series and applications at our customers.

MEASURABLY BETTER RESULTS WITH DEGASSED MATERIAL

The pictures are taken of two infused composite panels made out of 24 layers of 1200 gsm UD reinforcement infused with epoxy normal to fibre orientation at 30°C.



TECHNICAL DATA (of the shown system)

Maximum degassing capacity	1000 l/h
Vacuum level	< 5 mbar abs.
Control	Siemens PLC control with 7" HMI screen
Equipment	<ul style="list-style-type: none">▶ Automatic Vacuum pump protection system▶ Automatic controlled water-heating system with heat recovery
Optional equipment	<ul style="list-style-type: none">▶ Automatic water-cooling system available▶ 1200 litre IBC MX feeder system with Kamlok connection▶ 1000 litre vacuum buffer tank with automatic filling

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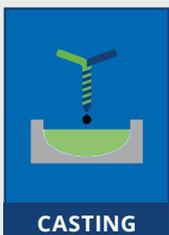


NODOPUR SERIES

SOLUTION FOR LIQUID COMPONENTS

System for processing liquid synthetic resins
made of polyurethane, epoxy or silicone.

Output from 0.1 l/min up to 100 l/min*



CASTING



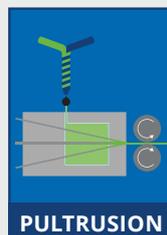
SPRAYING



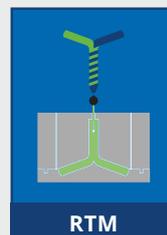
FOAMING



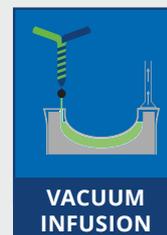
GLUING



PULTRUSION



RTM



VACUUM
INFUSION



FILAMENT
WINDING

*depends on viscosity, mixing ratio and hose length

NODOPUR

SOLUTION FOR LIQUID COMPONENTS

POSSIBLE APPLICATIONS

- ▶ Serial part production
- ▶ Electrical grouting
- ▶ Wind blade production
- ▶ Prototyping
- ▶ Tooling



Design example of a volume flow controlled NODOPUR with handling arm and own drive unit



Design example of a NODOPUR with gravimetric refilling direct from the IBC by free flow



For application and info movies please check our YouTube channel:

www.tartler.com/en/social-media



Get some more information about the NODOPUR series here:

www.tartler.com/en/products/nodopur-series/

The basic model is mounted on a mobile frame with integrated collection tray and can be equipped with various containers.

NODOPUR can be manufactured as a 1K dosing station, but can also be built as a mixing unit with several components. The system is controlled either by a simple operating unit or a Siemens touch panel. Our internal programming department designs the function and operation of each machine according to customer requirements or optimises it for the individual process.

In the case of controlled systems, the mixing ratio is set by the control system within milliseconds. In systems without volume flow control, the drives receive their setpoint speeds after calibration by the PLC.

With our buffer tanks which can be filled automatically by refill stations, you avoid process interruptions caused by a drum change during a dosing process. The refilling of liquid components can be done manually or also automatically from various containers.

For information on possible components and configurations, please contact our sales team.

TECHNICAL DATA

Components	1 or more components
Viscosity range	1 – approx. 60.000 mPas
Mixing ratio	Adjustable mixing ratio (self-regulating on request)
Output	0.1 up to 100 l/min
Control	Starting with simple user interface to touch panel
Tanks	Various tank sizes available
Available options	<ul style="list-style-type: none"> ▶ Volume Flow Control ▶ Refilling ▶ Heating (with agitator) ▶ Melting unit ▶ Automatic vacuum control ▶ Material degassing ▶ Mobile, powder-coated steel frame (free choice of colour) with integrated drip tray ▶ Static mixer or rotating (dynamic) disposable plastic mixer

TARTLER



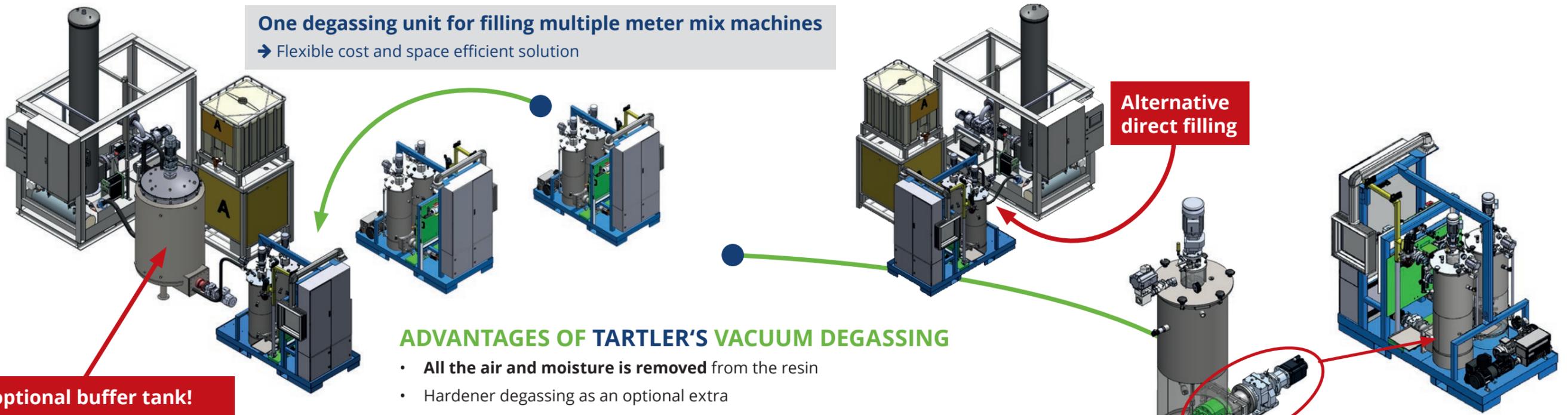
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One degassing unit for filling multiple meter mix machines
 → Flexible cost and space efficient solution

Add optional buffer tank!

- Store degassed material safely under full vacuum
- Optimise material temperature for dosing
- Fast filling when needed

ADVANTAGES OF TARTLER'S VACUUM DEGASSING

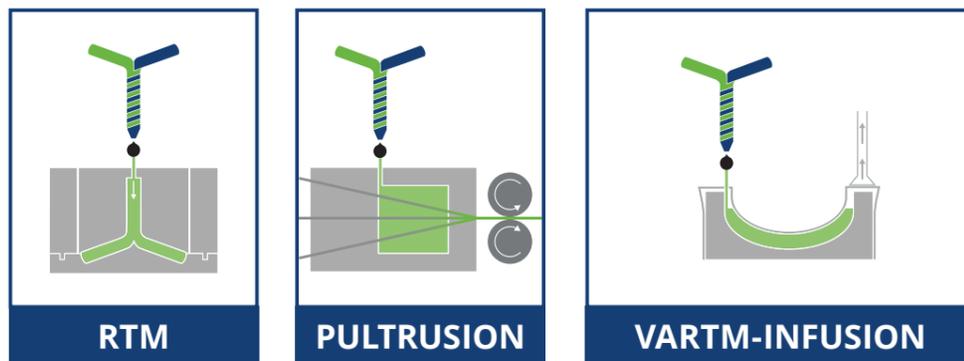
- All the air and moisture is removed from the resin
- Hardener degassing as an optional extra
- Excellent Degassing at capacity **up to 1000 litre per hour**
- **Optional Buffer tank** size according to customer requirement
- **Transfer material under vacuum** to meter mix machine
- **No degradation of degassing quality** over time

Maximum material quality
 → after degassing it is never exposed to air and moisture again!

Alternative direct filling

NODOPUR VS AR VF INFUSION METER MIX MACHINE

- **Pump is inside the tank** to guarantee no air can enter material
- Material always kept under **maximum vacuum in material tanks A and B**
- Material is under **vacuum when machine is dispensing** material
- **Maximum flexibility** without any fixed installations
- Tank size A and B according to customer requirement
- Flow rate and MR according to customer requirement



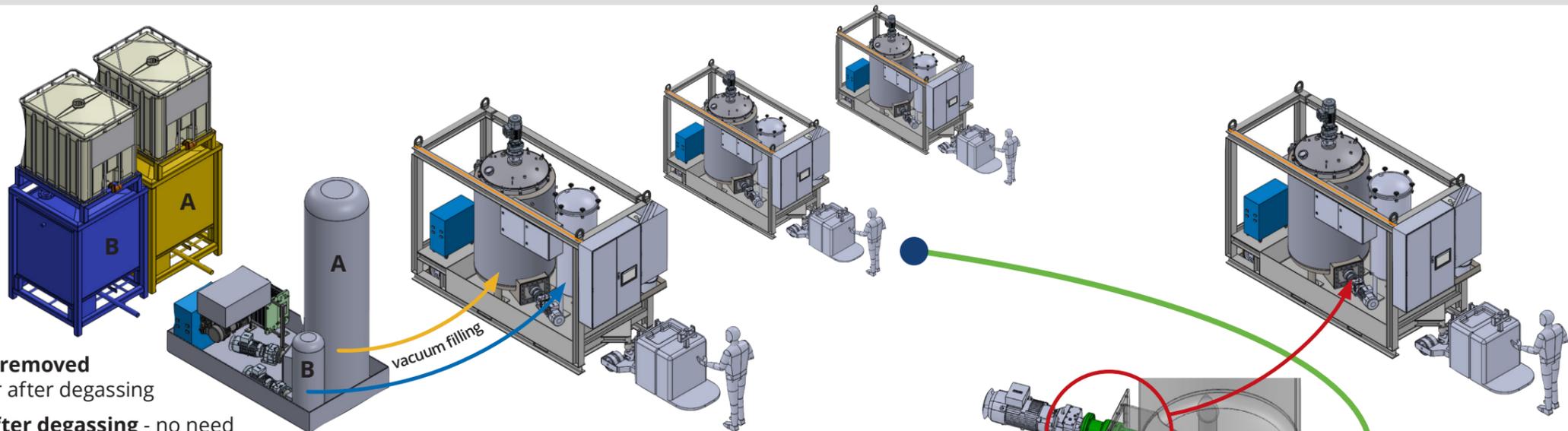
APPLICATIONS

- **Direct pressure controlled** resin injection for **RTM**
- **Pultrusion** with automatic flow and level control for one or two impregnation boxes.
- **Standard Infusion**
- **Direct infusion** direct pressure controlled and semi automated with no additional pressure sensors necessary
- **100% air and moisture free process**

ADVANTAGES OF TARTLER'S VACUUM DEGASSING

- All the air and moisture is removed from the resin and hardener after degassing
- Direct filling of machine after degassing - no need to store the degassed resin in separate IBCs
- Transfer material under vacuum from degassing unit to meter mix machine
- Excellent degassing quality with 18 kg/min capacity

→ **Maximum material quality**
because after degassing it is never exposed to the atmosphere again!

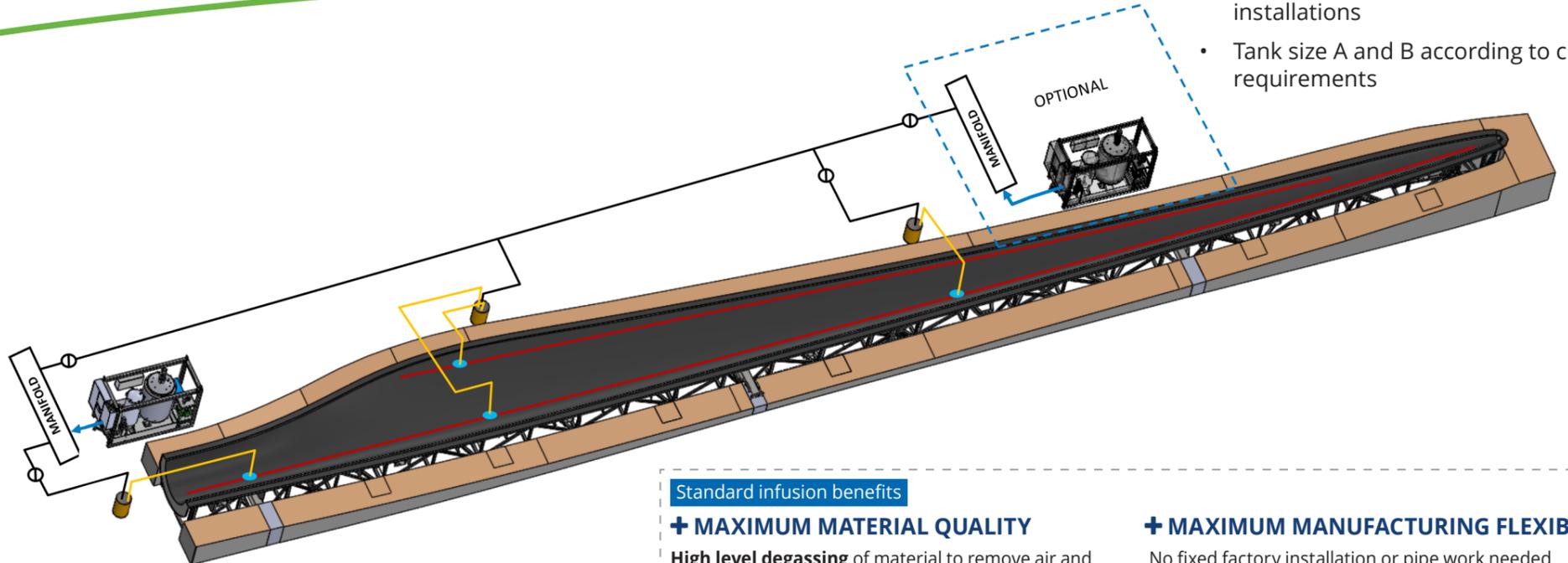


NODOPUR VS AR VF INFUSION

- Pump is inside the tank to guarantee no air can enter material
- Material always kept under **maximum vacuum in material tanks A and B**
- Material is under **vacuum when machine is dispensing** material
- **Maximum flexibility** without any fixed installations
- Tank size A and B according to customer requirements

PRACTICAL EXAMPLE: INFUSION WITH NODOPUR

- 20 kg/min flow rate per meter mix machine
⚡ higher flow rates available
- Combined 40kg/min trough booster line and 2nd meter mix machine
⚡ multiple machines possible, depending on process
- **Maximum flexibility** for different infusion set ups
- Low factory footprint
- Use **same meter mix machines for many moulds**

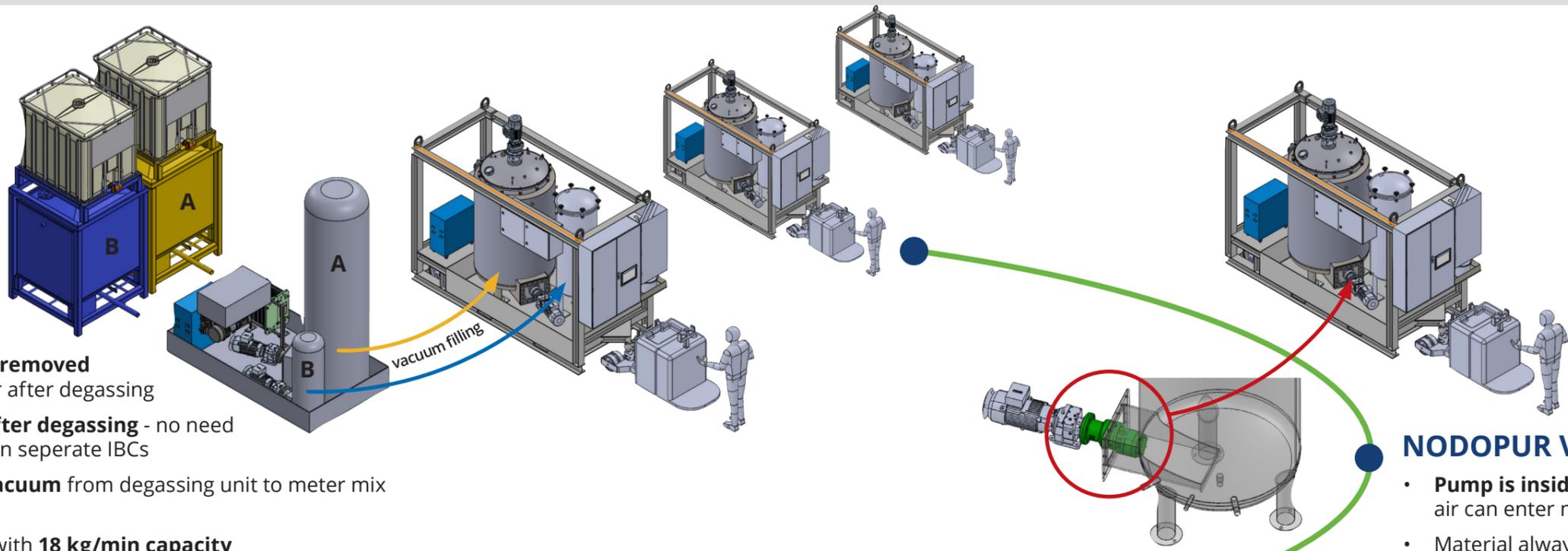


Standard infusion benefits	
<p>+ MAXIMUM MATERIAL QUALITY</p> <p>High level degassing of material to remove air and moisture</p> <p>Vacuum filling of machine ensures resin is never again in contact with the atmosphere</p> <p>Material is under maximum vacuum when meter mix machine is dispensing</p>	<p>+ MAXIMUM MANUFACTURING FLEXIBILITY</p> <p>No fixed factory installation or pipe work needed</p> <p>High flexibility in number of machines for different infusion set ups and flow rates</p> <p>Possibility to infuse several shells in parallel using additional meter mix machines</p> <p>Use the same meter mix machines for many moulds</p> <p>Use one degassing station for filling many machines</p>

ADVANTAGES OF TARTLER'S VACUUM DEGASSING

- All the air and moisture is removed from the resin and hardener after degassing
- Direct filling of machine after degassing - no need to store the degassed resin in separate IBCs
- Transfer material under vacuum from degassing unit to meter mix machine
- Excellent degassing quality with 18 kg/min capacity

→ **Maximum material quality**
because after degassing it is never exposed to the atmosphere again!

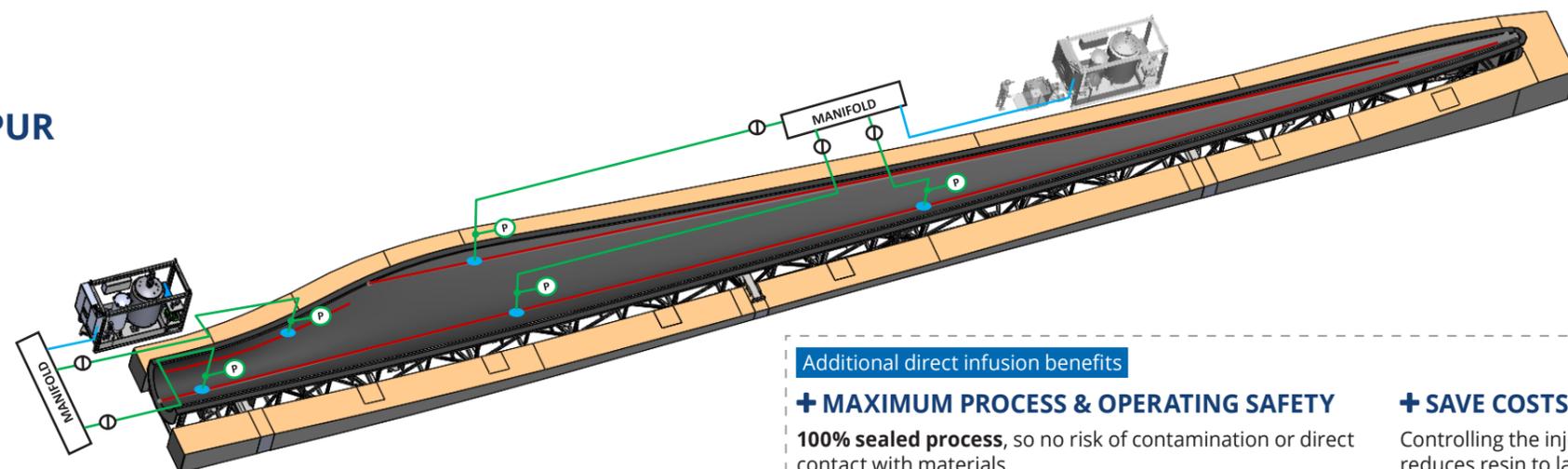


NODOPUR VS AR VF INFUSION

- Pump is inside the tank to guarantee no air can enter material
- Material always kept under **maximum vacuum in material tanks A and B**
- Material is under **vacuum when machine is dispensing** material
- **Maximum flexibility** without any fixed installations
- Tank size A and B according to customer
- Typically 20 kg/min maximum flow rate per machine - flow rate infinitely variable down to minimum 1.3 kg/min

PRACTICAL EXAMPLE: DIRECT INFUSION WITH NODOPUR

- **Direct pressure controlled** resin injection into blade
- Enables use of **faster hardeners** without risk of bulk exothermic reaction in material container - **reduces cure time**
- Enables control of resin to laminate weight ratio - **optimise blade weight and use of materials**
- **Increase SAFETY & reduce waste** - No more left over resin in buckets and spills
- **Semi Automatic process control** - Reduce risk and variation in infused volume

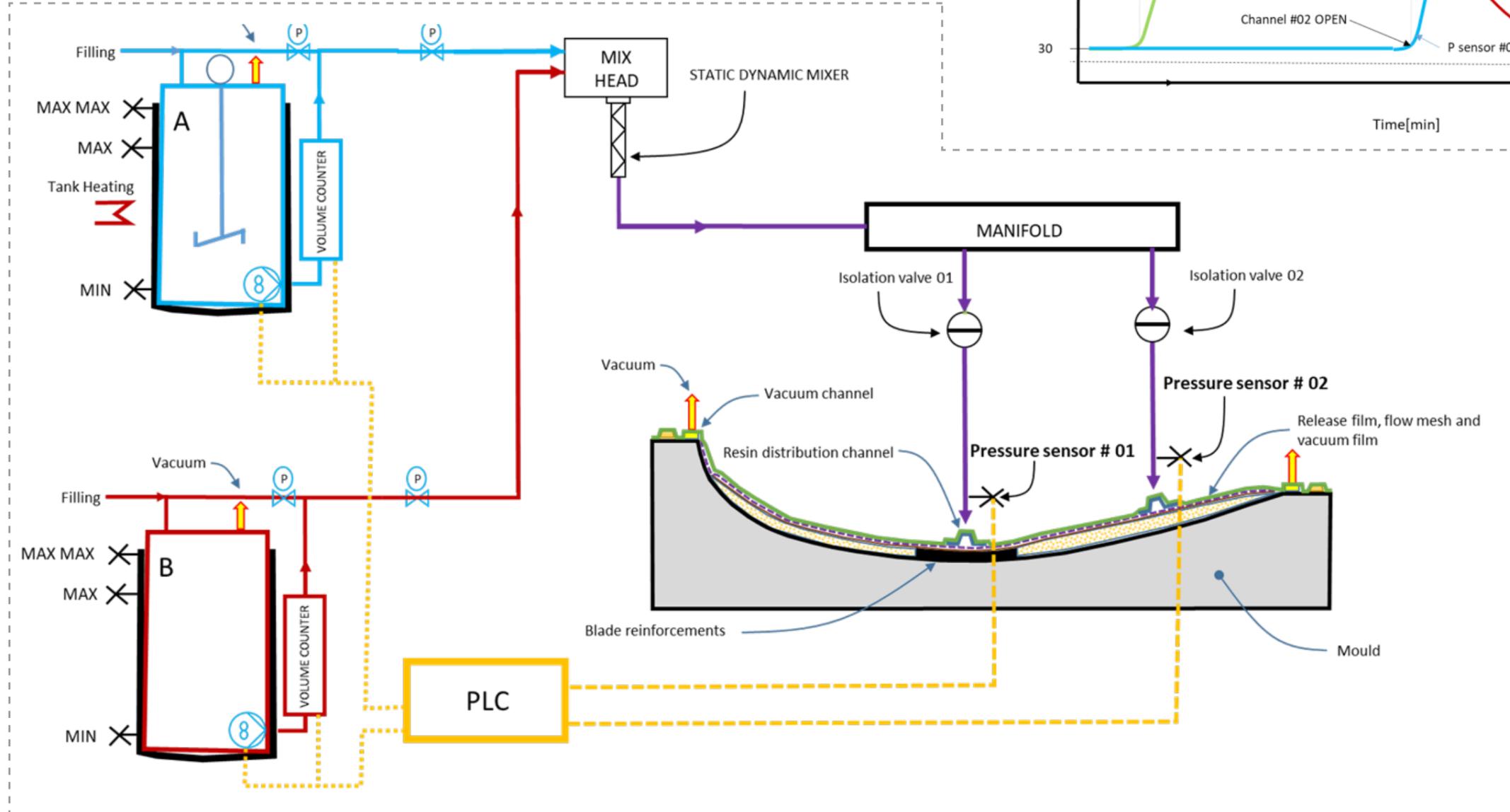


Additional direct infusion benefits

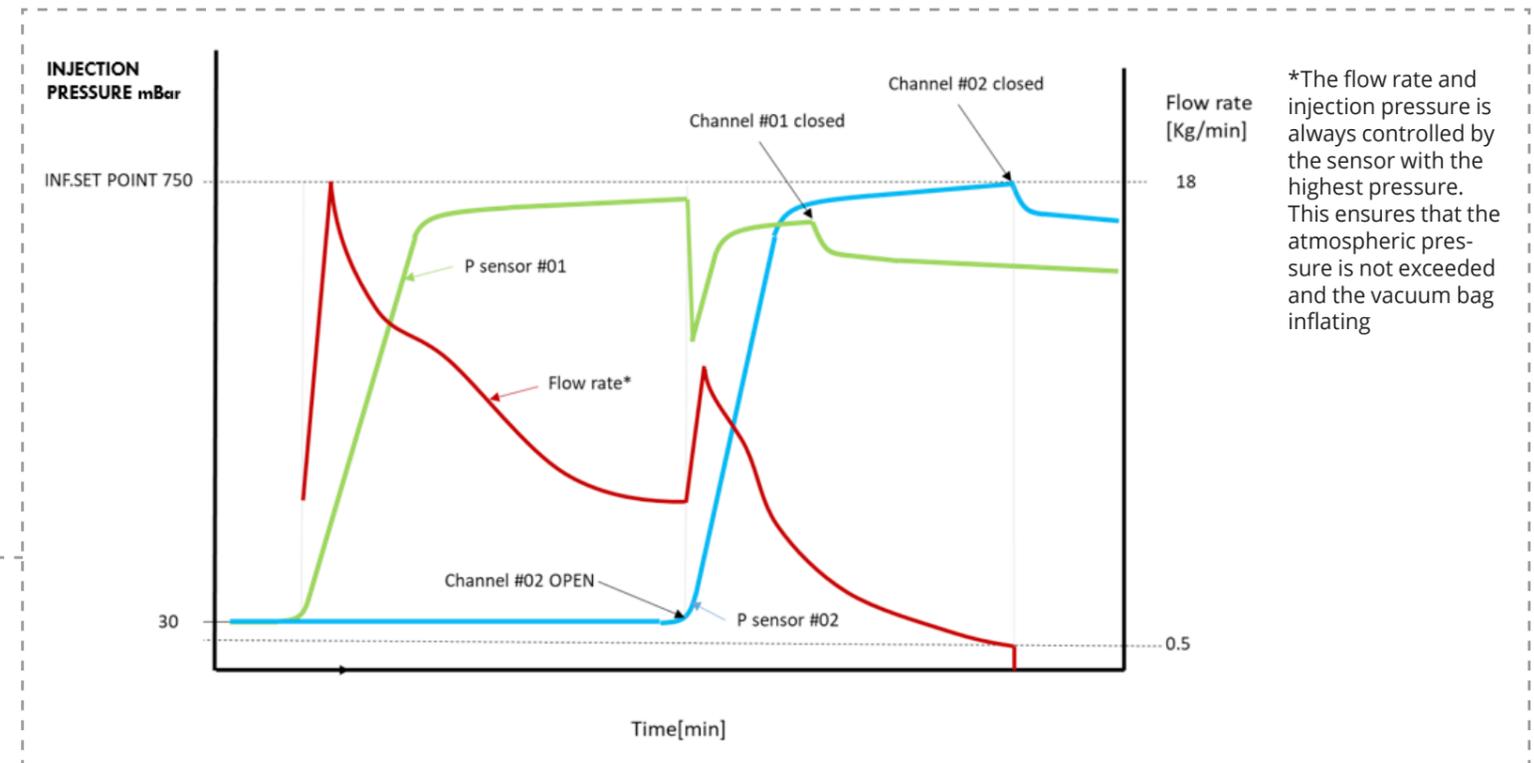
+ MAXIMUM PROCESS & OPERATING SAFETY
100% sealed process, so no risk of contamination or direct contact with materials
Direct pressure controlled resin injection into blade eliminates effect of varying mould height with pre-bent blades and pressure loss in infusion hoses
 Reduce cure time with **use of faster hardeners without risk of bulk exothermic reaction** in material container as material is mixed at point of use

+ SAVE COSTS
 Controlling the injection pressure during the infusion reduces resin to laminate weight ratio that enables **lower blade weight and less use of materials**
Reduce waste resin left over after infusion as use of mixed resin containers are eliminated
Semi-Automatic process enables injected material quantity to be controlled and reduces variation between each infusion

FLOW CHART



PRESSURE GRAPH



TARTLER

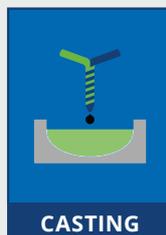


NODOPOX SERIES

SOLUTION FOR PASTY COMPONENTS

System for processing pasty synthetic resins
made of polyurethane, epoxy or silicone.

Output up to 30 l/min*



*depends on viscosity, mixing ratio and hose length

NODOPOX

SOLUTION FOR PASTY COMPONENTS

POSSIBLE APPLICATIONS

- ▶ Adhesive filling
- ▶ Wind blade production
- ▶ (Design) model construction
- ▶ Silicon application



Design example of a NODOPOX with vacuum-supported drum change for 50 l drums



Design example of a NODOPOX for 200 l drums with automated refilling and its own drive unit



For application and info movies please check our YouTube channel:

www.tartler.com/en/social-media/



Get some more information about the NODOPOX series here:

www.tartler.com/en/products/nodopox-series/

Whenever pasty or highly viscous media (no self-levelling) are involved, they are processed with drum follower plate systems. The material is obtained directly from the supplier drums. The most common sizes are 20 l hobbocks, 50 l and 200 l steel drums.

The configuration of a NODOPOX usually consists of a mobile basic system, which is supplemented by modules from the existing modular system. The systems can be designed as 1K, 2K or for more components. The mixing ratio is defined via the integrated Siemens control system in the operating panel. The required program modules are individually compiled in the PLC by our programmers and adapted to the application process. Pot life, shot quantity and, in case of volume flow controlled systems, also the mixing ratio, for example, can be set via the machine control on the touch screen.

With our buffer tanks which can be filled automatically by refill stations, you avoid process interruptions caused by a drum change during a dosing process. The refilling of liquid components can be done manually or also automatically from various containers.

In order to improve or even guarantee the process safety and for the user the operating safety, we recommend to choose a module from our vacuum options.

For information on possible components and configurations, please contact our sales team.

TECHNICAL DATA

Components	1 or more components
Viscosity range	from approx. 60.000 mPas
Mixing ratio	Adjustable mixing ratio (self-regulating on request)
Output	30 l/min
Control	Starting with simple user interface to touch panel
Tanks	20 l, 50 l, 200 l tank (supplier drums)
Available options	<ul style="list-style-type: none">▶ Volume Flow Control▶ Refilling / buffer container▶ Heating▶ Melting unit▶ Vacuum drum change▶ Mobile, powder-coated steel frame (free choice of colour)▶ Static mixer or rotating (dynamic) disposable plastic mixer▶ Separate drive unit or coupling device possible

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TARTLER



NODOPOX wind

SYSTEM FOR ADHESIVE PROCESSING

Tailored system to processing pasty epoxy resins
for the wind industry.

Output up to 20 l/min*



*depends on viscosity and mixing ratio

NODOPOX wind

SYSTEM FOR ADHESIVE PROCESSING

POSSIBLE APPLICATIONS

- ▶ Adhesive filling
- ▶ Wind blade production



Basic version of NODOPOX wind for two material drums (200 l)



Design example of NODOPOX wind with refilling (4-drum system) and pneumatic unwind and re-wind unit for power and air connection cables



Learn more about the „vacuum assisted follower plate“ upgrade (2nd option) on this info page:

<https://drumchange.tartler.com>



Get some more information about the NODOPOX wind series here:

<https://www.tartler.com/en/products/nodopox-wind/>

This drum-following plate system is a system solution for the highly efficient production and processing of synthetic resin-based adhesives. The configuration of the NODOPOX wind is tailored to the requirements in the wind industry.

It consists of a mobile basic system, which is supplemented by modules from the existing modular system. The system is designed as a 2K system, with an option for refilling resin and hardener. The material is obtained directly from the 200 l supplier drums. The mixing ratio is defined and controlled via the integrated Siemens operating panel. Potlife, shotsize and output can be set via the machine control on the touch screen.

To improve process safety and operator safety, we recommend to choose the module „vacuum assisted follower plate“ from our vacuum options.

For information on available components and configurations, please contact our sales team.

TECHNICAL DATA

Components	2 components
Viscosity range	from approx. 60.000 mPas
Mixing ratio	Adjustable mixing ratio with automatic regulation
Output	Flow rate specifiable within 5 l to 20 l/min
Control	TARTLER software, operation via touch panel
Tanks	200 l tank (supplier drums)
Basic equipment	<ul style="list-style-type: none"> ▶ Volume flow controlled ▶ Turnable handling arm (4.1 m high, 4.26 m long) ▶ Rotating (dynamic) disposable plastic mixer ▶ Mobile, powder-coated steel frame ▶ Various coupling devices for common towing units
Available options	<ul style="list-style-type: none"> ▶ Refilling / buffer container (4-drum system) ▶ Electric/pneumatic unwind and re-wind unit for up to 52 m long power and air connection cables ▶ <u>Vacuum assisted follower plate</u> ▶ Integrated air compressor

TARTLER



TARTLER Shanghai China Ltd.

Room 801, Block B, Hailiang Building,
No. 12, Lane 118, Zhongjiang Road

Shanghai 200062

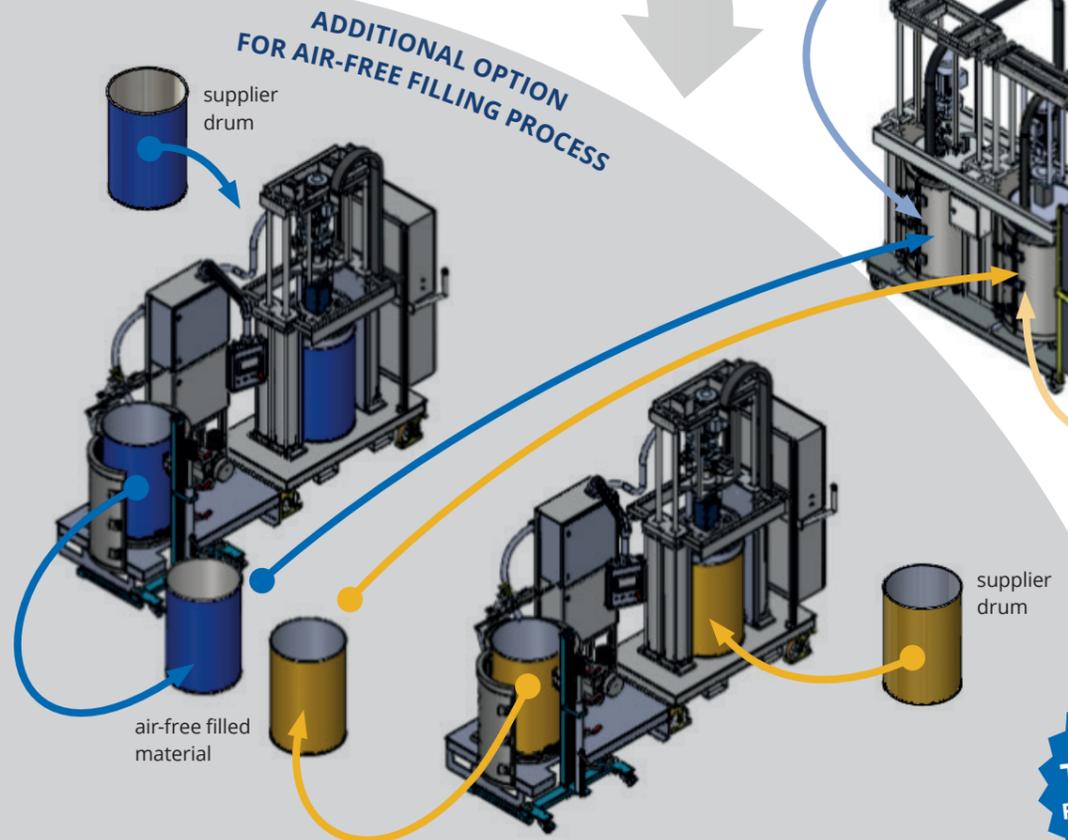
E-Mail: info@tartler.com

Web: www.tartler.cn

Mixing is possible

TARTLER'S PROCESS PROPOSAL

- 4 fixed stainless steel drums to increase the used material quantity
- Standalone refilling station with vacuum drum change for no air introduction during drum change
- Optional use of air-free filling unit to guarantee there are no air pockets in the material



AIR-FREE FILLING PROCESS

Degassing unit: NODOPOX 200 1K TAVA 200 F

ADVANTAGES OF TAVA 200 F

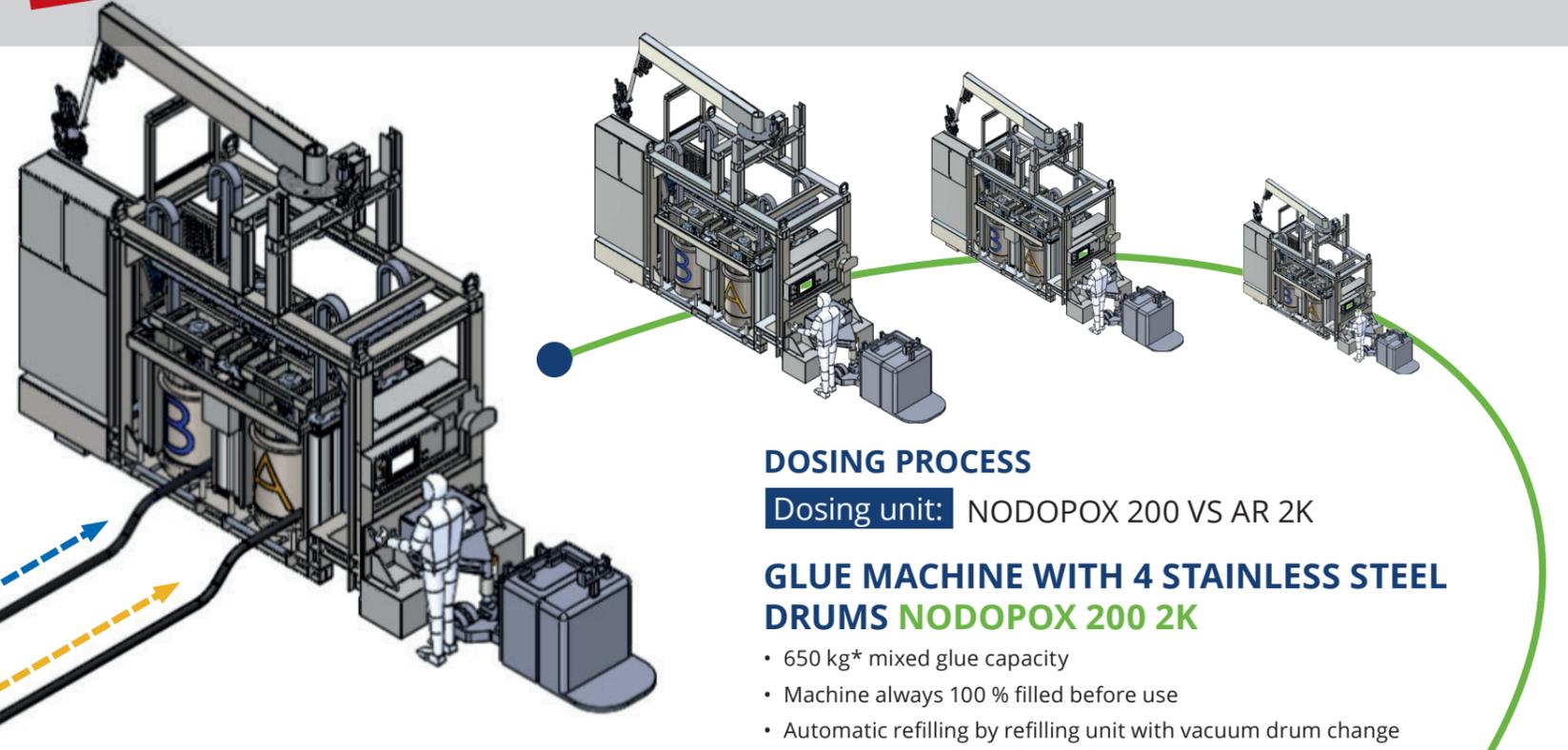
- 100 % guaranteed air-free resin & hardener
- Re-use of left over material
 - from inliner
 - from mixing ratio test
 - refill partly empty drums
- Excellent degassing quality with 20 kg/min capacity

Technical modification according to customer requirements

Benefit of the air-free filling process

+ 100% GUARANTEED AIR-FREE FILLING PROCESS

TARTLER RECOMMENDS



DOSING PROCESS

Dosing unit: NODOPOX 200 VS AR 2K

GLUE MACHINE WITH 4 STAINLESS STEEL DRUMS NODOPOX 200 2K

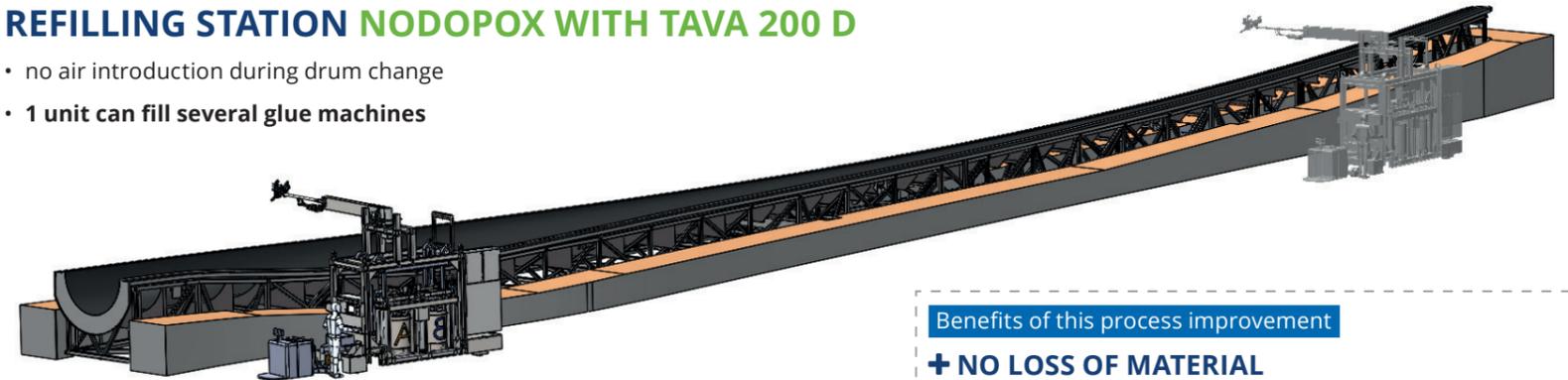
- 650 kg* mixed glue capacity
- Machine always 100 % filled before use
- Automatic refilling by refilling unit with vacuum drum change

VACUUM DRUM CHANGE & REFILLING PROCESS

Refilling unit: NODOPOX 200 2K TAVA 200 D

REFILLING STATION NODOPOX WITH TAVA 200 D

- no air introduction during drum change
- 1 unit can fill several glue machines



PRACTICAL EXAMPLE: GLUING APPLICATION

- Safe and precise driving with optional **integrated drive unit**
- Long reach **handling arm** of up to 5.8 m
- Safely add up to 15 m application hose after mixer without risk of blow off or bursting (Tartler DN32 Application hose)
- Glue profilers available on demand
- **Non stop gluing process** until blade is joined

Benefits of this process improvement

- + NO LOSS OF MATERIAL**
Refilling under vacuum = no introduction of air + no splashing
- + MAXIMUM PROCESS & OPERATING SAFETY**
No introduction of air during drum change
No splashing of material during drum change
No contamination of operator during drum change
- + SAVE TIME**
Double amount of material available on the machine (use of 4 stainless steel drums)
No refilling during the process necessary
- + SAVE MONEY**
One vacuum drum refilling station A/B for multiple use
Re-use of the material in the inliner

EXPLANATION: flow of materials drum movement

*depends on viscosity and mixing ratio

TARTLER

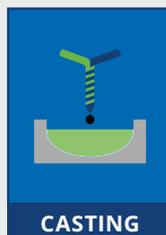


TARDOSIL SERIES

SOLUTION FOR PASTY RESINS AND LIQUID HARDENERS

System for processing pasty resins made of polyurethane, epoxy or silicone and liquid hardeners.

Output up to 30 l/min*



*depends on viscosity, mixing ratio and hose length

TARDOSIL

SOLUTION FOR LIQUID AND PASTY COMPONENTS

POSSIBLE APPLICATIONS

- ▶ Silicone mould production
- ▶ Adhesive processing
- ▶ Gelcoat processing



Design example of a volume flow controlled TARDOSIL with automatic refilling for A and B



Design example of a TARDOSIL with 200 l tank (A) and 30 l pressure tank (B) with automatic refill



For application and info movies please check our YouTube channel:

www.tartler.com/en/social-media



Get some more information about the TARDOSIL series here:

www.tartler.com/en/products/tardosil-series/

TARDOSIL series is required when pasty and liquid components have to be mixed homogeneously. With our patented dynamic disposable plastic mixers we achieve an optimal mixing result independent of large viscosity differences and/or an extreme mixing ratio.

The machines can be designed as mobile or stationary version. The number of components (2K or more), as well as the program functions and other equipment features from our modular range, depend on the requirements of your specific production process.

With our buffer tanks which can be filled automatically by refill stations, you avoid process interruptions caused by a drum change during a dosing process. The refilling of liquid components can be done manually or also automatically from various containers.

In order to improve or even guarantee the process safety and for the user the operating safety, we recommend to choose a module from our vacuum options.

Please contact our sales team for information on possible components and configurations.

TECHNICAL DATA

Components	2 or more components
Viscosity range	A: approx. > 60.000 mPas B: 1 – approx. 60.000 mPas
Mixing ratio	Adjustable mixing ratio (self-regulating on request)
Output	0.1 l/min up to 30 l/min
Control	Starting with simple user interface to touch panel
Tanks	A: 20 l (Hobcock), 50 l, 200 l B: 30 l, 60 l, 100 l oder 200 l
Available options	<ul style="list-style-type: none">▶ Volume Flow Control▶ Refilling▶ Heating (with agitator)▶ Melting unit▶ Vacuum▶ Material degassing▶ Mobile, powder-coated steel frame (free choice of colour) with integrated drip tray▶ Static mixer or rotating (dynamic) disposable plastic mixer▶ Separate drive unit or coupling device possible

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PRESS RELEASE 10/2021

Plastics Technology / Dosing and Mixing Technology / Fluid Technology / Material Handling / Resource Conservation

RESOURCE-SAVING DOSING AND MIXING OF SYNTHETIC RESINS

TARTLER offers complete solutions for silicone, adhesive and gelcoat processing

The TAVA F degassing station from SOMATA, a subsidiary of TARTLER GROUP, is an innovative solution for the cost-effective and resource-saving handling of pasty and liquid media. As part of a modular and expandable solution, it is a system component to the Tartler TARDOSIL series of multi-component metering, mixing and application systems. Users in silicone, adhesive and gelcoat processing in particular can significantly optimize material use improve process reliability.

Depending on the configuration, a TARDOSIL system can discharge up to 30 liters of ready-to-use material per minute. The mixing ratios can be set manually or self-regulating. The viscosity of the A component can be 60,000 mPas and higher; the viscosity of the B component can be between 1.0 and 60,000 mPas. A TARDOSIL is always equipped with a follower plate for high viscosity resin components, which takes the material directly from a cylindrical container; for the hardener

Michelstadt, October 2021. – The dosing, mixing and application systems of the TARDOSIL series from Tartler are designed for processing pasty synthetic resins and liquid hardeners made of silicone, polyurethane and epoxy. Their main areas of application include the production of silicone casting molds, adhesives and gel coatings such as those required in model making, aircraft construction, wind power engineering and medical technology. In combination with Tartler's disposable plastic rotary mixers, they enable the dynamic mixing of several components, which leads to very high-quality mixing results – no matter how great the differences in viscosities or mixing ratios.



Silicone, adhesive and gelcoat processors using a TARDOSIL (right) with TAVA F (left) can free liquid and paste-like material residues from interfering moisture and feed them back into the processing cycle. Significant savings in material purchasing can be achieved by this process.

component it can be equipped with tanks from 3.0 to 200 liters. Depending on customer requirements, it can be equipped with a conventional user interface or a modern touch panel control. In addition, Tartler offers numerous modules for function expansion and process optimization. These include volume flow control, automatic refilling, heating, a melting unit, a dedicated drive or coupling system and a stationary or mobile frame.

Significantly reduced material costs

As a special highlight for the modular extension of the TARDOSIL plants, Tartler now also offers the TAVA F degassing station from the range of SOMATA, a subsidiary of the TARTLER GROUP. This vacuum-based system enables silicone, adhesive and gelcoat processors to carry out the necessary filling and transfer processes around the TARDOSIL in an extremely resource-saving, waste-free and cost-reducing manner. Especially in plants where larger quantities of high- and low-viscosity fluids are processed, the TAVA F leads to a considerable reduction in material costs and a significant improvement in the life cycle assessment of the processing operations. The key reason: Thanks to the degassing station, significant quantities of pure material residues from opened barrels, from test runs or from the set-up phase no longer have to be rejected and disposed of, but can be reused.

On the basis of numerous practical analyses, Tartler engineers were able to document that even when barrels are properly emptied, considerable residual quantities still remain in the plastic inliner or in the barrel – clearly visible after each barrel change in the metering and mixing system. In addition, in many places there are several



Even when barrels are properly emptied, up to 14 kg of synthetic resin residue remains in their foil bag (inliner). With the TAVA F, they can be reprocessed and fed back into the silicone, adhesive or gelcoat processing process.

kilograms of as-new material from the quality control of the mixing ratios as well as other „waste“ from flushing, surpluses and ancillary work. However, due to the numerous air chambers and bubbles, including moisture, that form in the material when these residual quantities are transferred and filled into the usual barrels, it is not yet possible to return the residual material to production. This is because the entry of the disturbing moisture into the pump of the dosing and mixing plant during the removal, conveying and dosing of the material would massively impede further processing. With the usual consequences: process interruptions, repeated purging of the complete system, considerable material losses and additional costs because pre-



The dosing, mixing and application systems of the TARDOSIL series from Tartler are designed for processing pasty synthetic resins and liquid hardeners made of silicone, polyurethane and epoxy.



The TAVA F degassing station from the portfolio of the TARTLER GROUP subsidiary SOMATA consists of a device for clamping and stabilizing a barrel, a combination attachment for synchronized vacuum generation and filling, a vacuum pump and a control system with touch screen.

fabricated components might have to be replaced and upstream processes cleaned at great expense.

Residual quantities can be reused without problems

Users in silicone, adhesive and gelcoat processing who use a TARDOSIL with TAVA F are freed from these problems. This is because the degassing station removes the moist interfering air from the liquid and pasty residues and enables them to be filled safely and with low loss into the barrels, which can then be reintroduced into the processing cycle. Depending on the size of the company and the quantities of resin in circulation, significant savings in material purchasing can be achieved. At the same time, the user is making a considerable contribution to avoiding waste, conserving resources and improving the eco-balance of the product life cycle.

The TAVA F is available as standard for the air-free filling and refilling of 200- and 50-liter barrels, but can also be supplied for other container sizes on request. It consists of a device for clamping and stabilizing the barrel, a combination attachment for synchronized vacuum generation and filling, a vacuum pump and a control system with touch screen. All components are mounted on an easily accessible base with a barrel centering plate. While the loading of the station, the positioning of a still empty barrel and the closing of the clamping device can be done manually, the vacuum application of the barrel and the almost simultaneous filling of the material are done fully automatically. After a few minutes, a barrel is filled without air and is ready for use in production.

By the way: Both the operation of the TAVA F and the functionality of the TARDOSIL are showcased in various videos on Tartler's YouTube channel.

TARTLER GmbH and TARTLER GROUP:

Dosing, mixing and filling systems for multi-component synthetic resins

Founded in 1981, TARTLER GmbH is a medium-sized family business with headquarters in Michelstadt in the Odenwald region of Hesse, Germany. Since 2018 it has been led by Udo Tartler and Sandra Tartler-Herbst. It is part of the TARTLER group of companies, which also includes ETP Walther GmbH, ZT Odenwald GmbH and SOMATA GmbH. In 2020, the TARTLER GROUP generated a total turnover of around 14.5 million euros and currently has a headcount of 80 employees.

In cooperation with material manufacturers, TARTLER develops and produces modern single and multi-component dosing and mixing systems for polyurethane epoxy resin and silicone processing tailored to customer requirements. One of the company's special competencies is the realization of tailor-made so-

lutions, such as special systems for processing pastes and synthetic resins with unusually large differences in viscosity or extreme mixing ratios. Two in-house developments are also worth mentioning: the dynamic static mixer (rotating disposable plastic mixer), which eliminates the use of environmentally harmful rinsing agents, as well as universally usable, very compact mixing head versions without dead spaces. Since 2016, the company has also been implementing innovative vacuum-assisted drum changing and filling stations for air-free material handling.

In addition to the installation and commissioning of machines, TARTLER's service also includes the instruction and training of the customer's employees and their support during the entire period of use of the machine. In 2013, the

company commissioned its new main plant in Michelstadt, which combines all process stages from development to final acceptance under one roof. Here the mixing plants are also linked to handling systems. This means that customers can be offered process-based dosing, mixing and filling equipment together with downstream CNC application systems, robots, winding systems, vacuum chambers or presses.

TARTLER's customers include well-known companies from the aerospace, automotive and boat building industries as well as model and mold making. Users in the wind power, electrical and consumer goods industries are also among the customers of TARTLER's two- and multi-component dosing and mixing systems as well as filling systems.

Note for editors: text and photos are available at www.pr-box.de/



Further information about the TARDOSIL series and TAVA F can be found on our website:

- ▶ <https://www.tartler.com/en/products/tardosil-series/>
- ▶ <https://www.tartler.com/en/products/tava-f/>



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USEFUL LINKS

▶ tartler.com/en/products/nodopur-series

▶ tartler.com/en/products/nodopox-series

▶ tartler.com/en/products/tardosil-series

▶ tartler.com/en/products/tava-f



For application and info movies please check our YouTube channel: <https://www.tartler.com/en/social-media/>

ABOUT TARTLER GROUP

System and supply services for mixing, dosing and filling technology

TARTLER GROUP

The medium-sized TARTLER GROUP, headquartered in Michelstadt, Germany, achieved a total turnover of around 14.5 million euros in 2018. It is managed by Udo Tartler and Sandra Tartler-Herbst and currently employs 90 people. In addition to TARTLER GmbH, the group includes ETP Walther GmbH, ZT Odenwald GmbH, SOMATA GmbH and the foreign subsidiary TARTLER (Shanghai) Trading Co., Ltd.



TARTLER GmbH based in Michelstadt, is the parent company of the TARTLER GROUP and has been one of the leading German plant manufacturers and system providers in the field of dosing and mixing technology since 1981. As a specialist for custom-made products for the application of polyurethane, silicone and epoxy resins, TARTLER GmbH realises with a high degree of customer orientation and in close cooperation with well-known material manufacturers customer-specific dosing, mixing, filling and application systems for the processing of synthetic resins in research, industry and trade.

As an independent company of the corporate group, TARTLER (Shanghai) Trading Co., Ltd. offers a Nodopox system for adhesive processing tailored for the Asian market.

ETP WALTHER



ETP Walther GmbH is also located in Michelstadt and is considered a specialist for electrical engineering & planning, electrical design as well as control technology and switch cabinet construction (certified according to UL 508 A). The company supplies system installation and programming from one single source. The equipment and assembly of TARTLER GmbH's dosing and mixing systems as well as the realisation of control systems and switch cabinets for conveyor, painting and fountain systems have been part of ETP Walther's core business for more than 30 years.

ZT ODENWALD



ZT Odenwald GmbH, based in Erbach, produces as a specialist in machining technology, small and medium-sized series as well as prototypes, individual parts and special parts using state-of-the-art lathes and milling machines. It is a system and component supplier for TARTLER GmbH, but with its focus on the realisation of high-quality and geometrically complex metal components for use in fluid technology, it is enjoying growing demand from renowned machine, plant and apparatus manufacturers.

SOMATA



SOMATA GmbH, located in Michelstadt, was founded in order to realize special machines related to dosing and mixing technology. As a system manufacturer of assemblies – with the focus on automation of handling devices – SOMATA GmbH is a system supplier for TARTLER GmbH and others. The planning and manufacture of these assemblies, as well as the implementation of granted patents are also business areas of SOMATA GmbH, which has been part of the TARTLER GROUP since 2016.