

EQUIPMENT FOR CAST RESIN INSULATION

TOP
EXPERT
SOLUTIONS

Setting the pace in vacuum
equipment engineering.

At a glance:

EQUIPMENT FOR CAST RESIN INSULATION

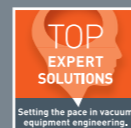


Wherever reactive resin systems are processed, this is where our design for preparation, mixing and dosing is implemented. Based on our decades of experience and in close cooperation with users, material suppliers and testing labs, we have permanently developed and perfected our vacuum systems for cast resin insulation.

To name just a few of our innovations let us introduce the on demand principle for on-the-fly degassing and our patented on-the-fly formulation units for a continuous preparation of the desired cast resin system.

ADVANTAGES OF CAST RESIN INSULATION EQUIPMENT

- Batchwise or continuous degassing of highly viscous and filled cast resin components
- HEDRICH dosing pump portfolio for unfilled and highly filled cast resin components
- HEDRICH UFC flow heater
- HEDRICH robot arm casting nozzle
- HEDRICH on-the-fly formulation and degassing
- Patented online dosing supervision applying the highly precise Coriolis measuring principle
- Competitive single-line OTF-F/OTF-D systems
- Industry 4.0 capable software communication with superior and parallel computer systems



➔ VACUUM RESIN CASTING EQUIPMENT

For the vacuum casting of components, HEDRICH manufactures casting chambers that are individually adaptable both in size and shape to the products to be cast. The equipment can be provided with conventional preparation mixers or as modern continuous on-the-fly formulation and degassing systems. The high shear forces in all mixing systems ensure optimum wetting of the fillers.

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➔ VACUUM PRESSURE GELATION EQUIPMENT (APG)

The process of the automatic pressure gelation (APG) is ideal for components of large lot sizes, among them insulators, switch gear parts or instrument transformers. The moulds are pressure tight and fixed in a clamping unit. Casting is done mainly under atmospheric pressure. Optionally, pressure gelation is also possible under vacuum or with SF6 gas.

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➔ VACUUM SHOT DOSING EQUIPMENT

For manufacturing sensitive electronic components, HEDRICH develops fully automatic casting lines. The components are optimally insulated under vacuum, excluding faults, at maximum output. Highest flexibility is another feature due to the casting nozzles, which are arranged inside the vacuum casting chamber, allowing three dimensional positioning of the pour-in point.

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➔ VACUUM INFUSION EQUIPMENT

For the casting of rotor blades for wind energy systems and high-quality composite parts, HEDRICH has developed vacuum infusion equipment, which operate fully automatically and under permanent vacuum. The process is not only characterized by very high quality of the final products but also contributes to increasing the production by minimum waste and material loss.

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Vacuum Resin Casting Equipment

HEDRICH vacuum resin casting equipment can be provided both with conventional thin-film degassing mixers for batchwise preparation or with modern, continuous on-the-fly formulation and degassing systems. The high shear forces in all HEDRICH mixing systems grant optimum wetting of all filler types. For the casting of components under vacuum, HEDRICH manufactures casting chambers that are individually adaptable both in size and shape to the products to be cast. The supplying scope ranges from the manually chargeable casting chamber to the fully automatic tunnel-type casting tank with transport systems for liquid and solid resin applications.

ADVANTAGES OF VACUUM RESIN CASTING EQUIPMENT



- Batchwise DEM or continuous OTF degassing possible
- HEDRICH dosing pump design depending on the application: ceramic, high-pressure or gear-type dosing pump
- Hydraulic or motor synchronized dosing pumps
- Highest material flow rate of 24 t/day
- Integrated SF6 filling and recovery system
- Competitive single-line OTF-F/OTF-D systems
- Industry 4.0 capable software communication
- Online dosing supervision applying the highly precise Coriolis measuring principle

→ EFFICIENT DEGASSING

The HEDRICH thin-film degassing mixer (DEM) is preferably used to fast and efficiently degas higher and high viscous cast resin systems, containing abrasive fillers. A good wetting of the filler as well as perfect degassing (gas and moisture extraction) of the cast resin components are the most important factors for a perfect insulation.



→ AGAINST WEAR

The dosing pistons and sleeves of the HEDRICH dosing pumps consist of oxide-ceramic materials (silicon carbide). As a result, their service life is very long, and can even be extended by the intelligent design. A 180° turn allows the dosing piston to be used again for exact dosing. The sturdy, hydraulic drive grants long-term operation.



→ IDEALLY WETTED

One of the highlights is the fully continuous formulation with low mass volume and high shear rates, achieving a homogeneous cast resin pre-mixture within short. Combined with the downstream OTF on-the-fly degasser, high-quality cast resin materials are generated in continuous operation. With the ideal filler grain wetting and the optimum degassing degree, they provide best insulation properties for medium and high voltage applications.



→ CONTROLLABLE ALL-OVER

The range of the robot arm covers the whole cross section of the casting tank. The movement can be controlled manually via joystick or automatically by a casting program. The smooth design allows easy cleaning in case of maintenance. The arm is completely heatable/coolable up to the casting nozzle. By cooling-down the cast resin compound, reactivity can be slowed down. So, in many cases a purging of the equipment can be avoided during production interruptions.



APPLICATIONS

- Cast resin transformers
- Insulating parts for medium and high voltage switch gears
- High voltage bushings
- Current and voltage transformers



APG Vacuum Pressure Gelation Equipment

Besides vacuum casting, HEDRICH also manufactures equipment for the automatic pressure gelation (APG). This process has proven its excellence especially for components with large lot sizes, such as insulators, switch gear parts and instrument transformers. The moulds are pressure tight and fixed in a clamping unit. A batchwise and continuous process is possible. Casting is done mainly under atmospheric pressure. Optionally, pressure gelation is also possible under vacuum or with SF6 gas.

ADVANTAGES OF APG VACUUM PRESSURE GELATION EQUIPMENT



- HEDRICH full-ceramic or high-pressure dosing pumps depending on the application
- Fully automatic vacuum pressure gelation production line for electric drives
- Patented fully automatic APG production with integrated screen processing
- Multi-injection process for the casting of components with large part weights
- Material flow rate up to 10 t/day
- Patented online dosing supervision applying the highly precise Coriolis measuring principle
- PreCHECK™ filling and pressure test of the dosing pumps already before casting
- Connecting possibilities of up to 20 clamping units to one preparation system
- Patented casting process with subsequent pressure gelation tunnel oven system
- UFC technology to reduce cycle times and increase quality

→ FAST AND CONTINUOUS

The OTF on-the-fly degasser achieves a very fast homogenization and degassing of filled epoxy resins after one single pass through. Short degassing and mixing time within a few minutes due to high shear forces between the stirring combs as well as degassing in thin layers. The degassing quality can be observed and inspected at any time through sight glasses in the OTF as well as the buffer vessel.



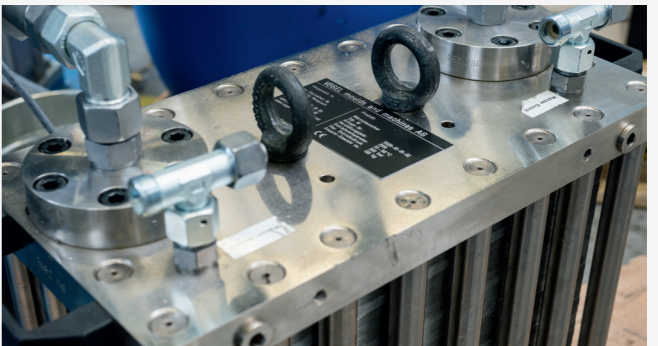
→ POWERFUL AND PRECISE

The high-pressure dosing pumps are driven hydraulically. This means that the energy source already provides a linear movement as the pump itself and thus excludes the risk of inaccuracies. Filler portions as high as with no other pump can be reached. The extremely wear-resistant design of the high-pressure dosing pumps ensures very long service lives.



→ UFC – THE PRODUCTIVE TURBO

The patented HEDRICH UFC technology allows to achieve very short gelation times. The cast resin compound is heated up by the HEDRICH developed UFC (Ultra Fast Compound) heater immediately before entering the moulds. So, we can grant a shortening of the gelation time with highest quality and resulting improved productivity of each clamping unit up to 50%.



→ FULLY AUTOMATIC PRODUCTION

The robot is provided with a multifunction gripper arm to take over the complete process from loading and unloading of the mould as well as cleaning after demoulding and preparation for the next casting cycle. One robot can be used to operate several clamping units.



APPLICATIONS

- | | | |
|---|--|--------------|
| ■ Insulating parts for medium and high voltage switch gears | ■ Stators and rotors of high-capacity motors | ■ Insulators |
| ■ Current and voltage transformers | ■ Medium voltage bushings | |



Vacuum Shot Dosing Equipment

HEDRICH develops special casting equipment for the highly precise potting of electronic components under vacuum. Vacuum shot dosing systems are, amongst other applications, dedicated to casting automotive ignition coils, sensors or small transformers. The partially or fully automatic equipment can either be employed as stand-alone solution or supplied as complete line including continuous throughfeed ovens and plasma treatment.

ADVANTAGES OF VACUUM SHOT DOSING EQUIPMENT

➤ Highest flexibility by 3D positioning system

➤ PreCHECK™ filling and pressure test of the dosing already before casting

➤ Full-ceramic dosing pistons with longest service life

➤ 3-chamber vacuum casting tank for max. productivity

➤ Inside or downstream TopOff casting with automatic measurement of the cast resin compound level

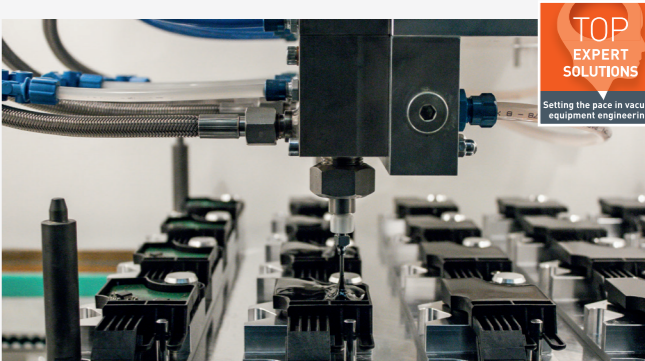
➤ Casting of cast resin with abrasive fillers

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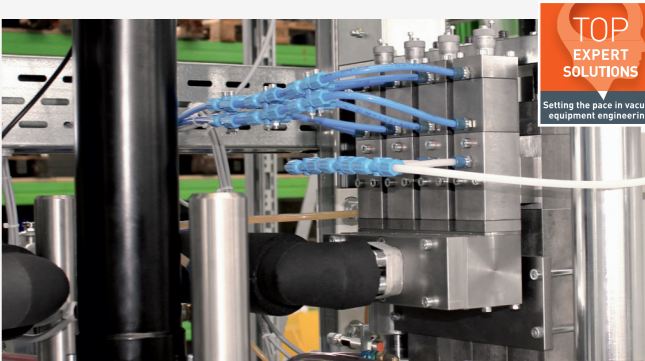
→ MAXIMUM FLEXIBILITY

The HEDRICH 3D positioning system provides highest flexibility in production irrespective of height, width or geometrically variable part sizes. The casting nozzles are moved to the component and not vice versa. The up-to-the-rim filled parts are moved as little as possible to avoid spilling of the casting compound. Simultaneous movement of casting nozzles and pallets optimizes the casting process, thus minimizing the cycle times.



→ FAULTLESS DOSING

Most dosing supervision systems only detect a fault in the filling quantity during casting, thus generating unnecessary waste by casting errors. The new HEDRICH PreCHECK™ system, however, recognizes an improper dosing of the cast resin components yet before casting. Therefore, waste is avoided.



→ EXTREMELY STURDY

The casting nozzles of all HEDRICH shot dosing systems are provided with ceramic-made closing pins as standard. These extremely wear-resistant closing pistons grant very long service life with a highly precise and drip free casting.



→ DETAILED PROTOCOL

To increase the process quality assurance, all component-specific casting parameters are stored in a database system, enabling a detailed retraceability of each cast component.



APPLICATIONS

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|----------------------|-------------------|--------------------------|
| ■ Ignition coils | ■ Sensors | ■ Electronic small parts |
| ■ Small transformers | ■ Electric motors | |



Vacuum Infusion Equipment

The HEDRICH “VIA” line has already established itself successfully on the wind energy market, offering significant advantages for the production of high-quality composite components compared with other manufacturing processes. The consequent process under vacuum considerably increases the product quality, so cost-intensive reworking becomes completely obsolete. Constant quality on highest level along with minimization of production and disposal costs for material loss are the features to make the fully automatic HEDRICH vacuum infusion concept become the most efficient solution for high demands on the composite market.

ADVANTAGES OF VACUUM INFUSION EQUIPMENT



- World's innovation: completely fully automatic vacuum casting of rotor blades without reabsorption of gas of the prepared cast resin components
- Quality improvement by less air accumulation
- Shorter mould occupation times and thus increase of production by abt. 10%
- Elimination of additional post-curing times
- Minimization of cast resin disposal costs
- Less material consumption by lower safety margins
- Separate degassing of resin and hardener for quality improvement
- Casting quantities up to 70 kg/min
- Technology for infusion also applicable for the pressure gelation technology

→ RIGHT PERFECT

Throughout the whole infusion process, the carrier matrix is continuously kept under vacuum, thus avoiding enrichment with gases. The result is a significant increase of the product quality and no costs necessary for machining. Additional post-curing times are also eliminated, and support productivity by a multitude.

→ INTELLIGENT INFUSION

The filling and mixing station [INFUCUBE] contains a soft-bag to control the cast-resin refill process as required. This softbag is refilled automatically depending on the quantity consumed. So, there is just a minimum amount of remaining reactive material available at the end of the infusion process. Contaminated parts as hoses, softbag and static mixer are very low-priced one-way consumables.

→ CONSTANT QUALITY

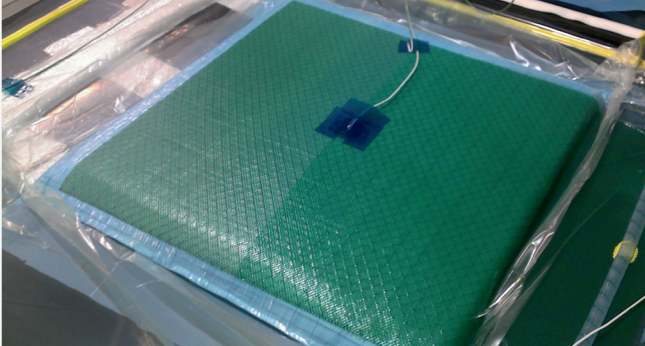
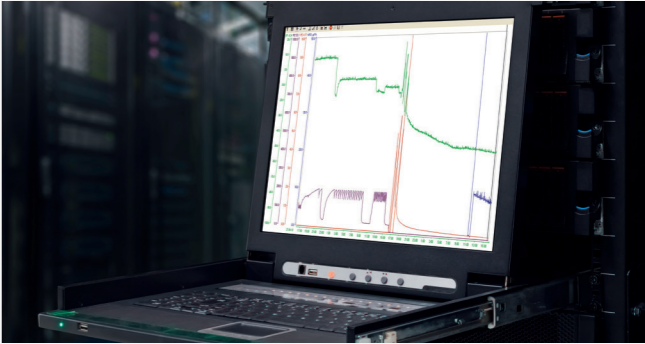
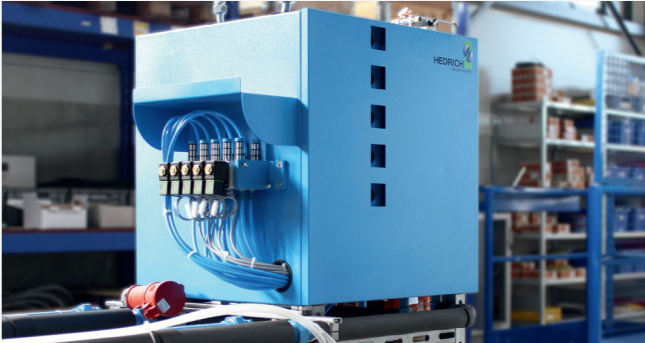
The HEDRICH “VIA” line provides a system to measure the residual moisture of fibre and core components, dry them under vacuum until a freely defined residual moisture degree is reached and then infuse the compound automatically. This fully automatic process saves time, energy, man-power and grants reproducibility of highest quality requirements.

→ OPTIMALLY WETTED

The HEDRICH preparation concept ensures at any time the proper quantity of perfectly prepared cast resin compound for steadily optimally dehumidified fibre and core components. The finished product thus holds the desired density in structure and a maximum stability.

APPLICATIONS

- | | | |
|-----------------------|----------------------|------------------------|
| ■ Wind energy systems | ■ Aerospace industry | ■ Structure parts |
| ■ Automotive | ■ Boat building | ■ Composite components |





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PROGRESS

is feasible.