



## HIGH SHEAR GRANULATION

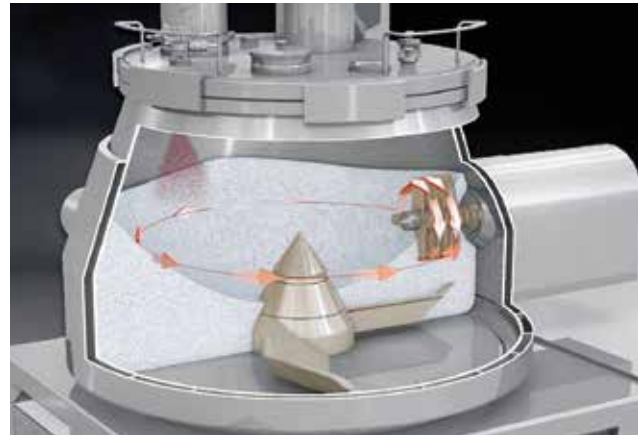
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## VERTICAL GRANULATOR VG

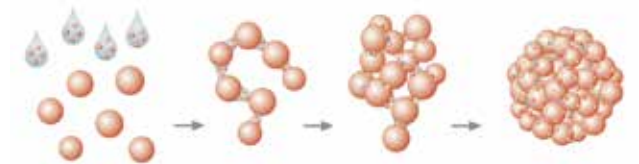
### *Overview and Principle*

High shear mixers for wet granulation from Glatt have been used for decades in the pharmaceutical industry. Today, robust and reliable vertical granulators from Glatt are setting new standards in the pharmaceutical manufacturing process. Above all, they are the first choice when the process needs high granulate density and rapid granulation. They also require relatively little space, are simple to operate and – now more important than ever – are easy to clean. This means innovative Glatt VG technology is ideally equipped for the future.

For years now, Glatt has been continuously striving to develop vertical granulators. The efficient operational performance of the vertical granulators is founded on the Z-Rotor, originally patented by Powrex.



**VG principle**



**From powder to granule**



**Granulation line**

### *Flexibility in the whole line*

Glatt provides a wide range of system configurations up to the VG 2000, covering different process requirements, batch sizes and layout concepts. In recent years, Glatt has expanded its range of models in line with the changing market requirements. The current series of machines includes the VG 15/05 and VG 65/10 designed to handle small quantities, with adapter modules suitable for even the smallest laboratory scale of 1.0 l. The VG 15/05 is also available as a module of the

newly-developed Glatt multi-lab system. At the pilot scale, the product line with interchangeable vessels up to the VG 100 offers increased flexibility and thus made-to-measure utilization of the pilot units. The working vessels between 10 and 100 liters are coupled to the through-the-wall technology module. The entire VG product range is available as a PRO version, without exception.



**VG 65/10**



**VG 100/10**



**VG 2000**

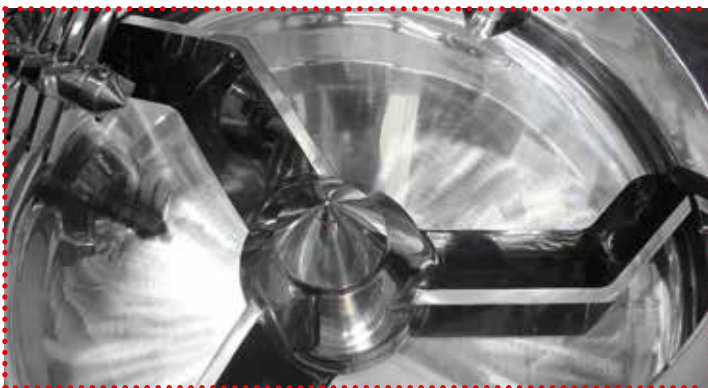
## VG FEATURES

As a flagship of the wet mixer range, the Glatt vertical granulator distinguishes itself through its know-how as a whole as well as the individual unit components that are absolutely crucial to users.



### *Chopper*

To ensure an optimum granular structure, the VG is equipped with a chopper with straight blades. The position of the chopper in the lower third of the working vessel results in its very high level of efficiency, even in the event of minimum filling volumes.



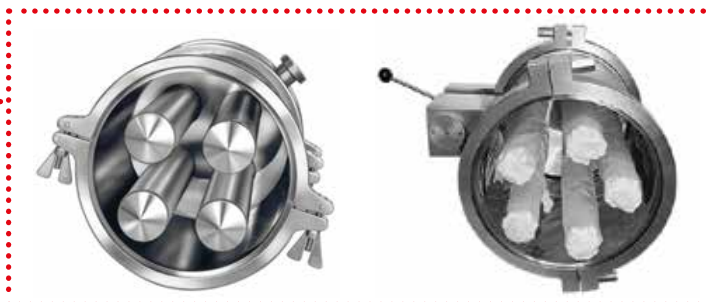
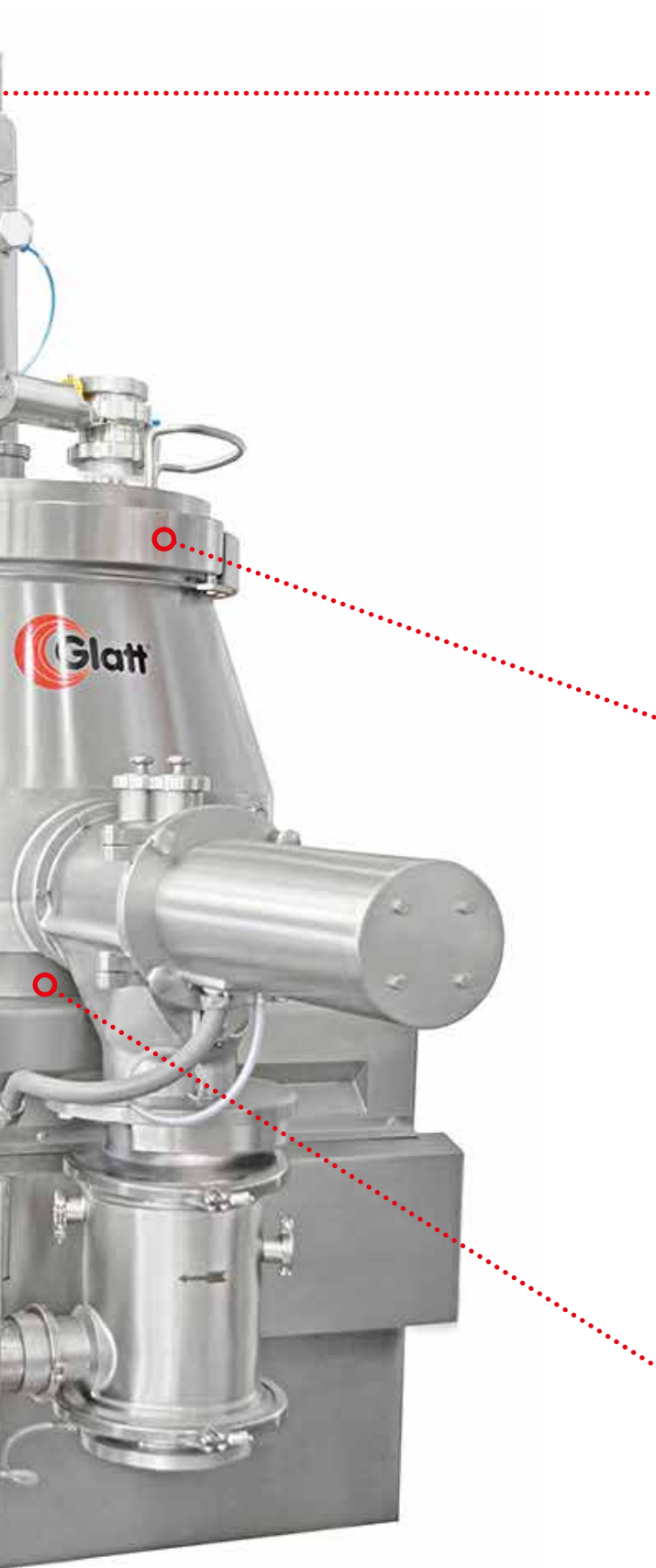
### *Z-Rotor*

The all-important tool in the wet mixer is the bottom-driven Z-Rotor. The unique geometry of the Z-Rotor ensures maximum efficiency while minimizing the power required. Cutting-edge measuring and manufacturing processes ensure that the gap between the rotor and the bottom of the working vessel is kept to a minimum while maximizing product yield.



VG 600





### *Outlet air filter*

With textile or stainless steel filter elements that can be cleaned sequentially, the outlet air filter is unrivaled in the production units at Glatt. This guarantees process safety satisfying even the most stringent demands be it in the suction of powders, the granulation process or product drying in single pot mode. Thanks to pivoted filter housings, access to the filter elements is child's play. For WIP and CIP alike, every requirement is met.



### *Working vessel cover*

Depending on the specific opening requirements, the production unit cover can be swiveled horizontally or opened vertically by means of a drive mechanism.



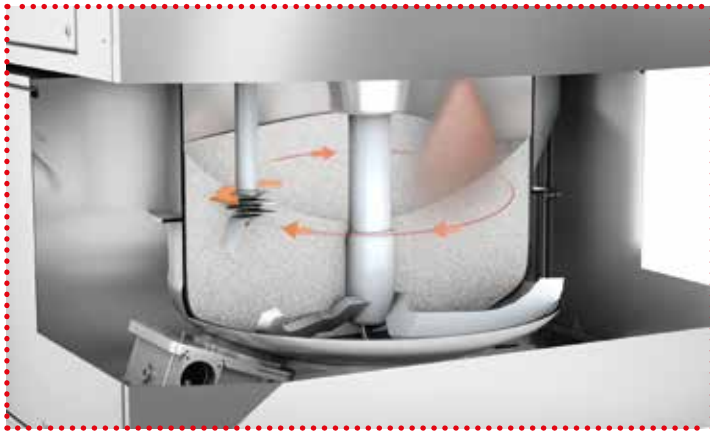
### *Rotor-lifting device*

By using the automatic rotor-lifting device, there is absolutely no need to disassemble the Z-Rotor for inspection and cleaning validation purposes. The rotor can be lifted up to 100 mm, depending on the VG.

## TDG FEATURES

### Highlights

Fitted with a top-driven anchor rotor, the top-drive granulator, or TDG, completes the range of Glatt wet granulators. The Glatt TDG also covers the entire spectrum of sizes, from the laboratory scale to the TDG 1500 production unit.

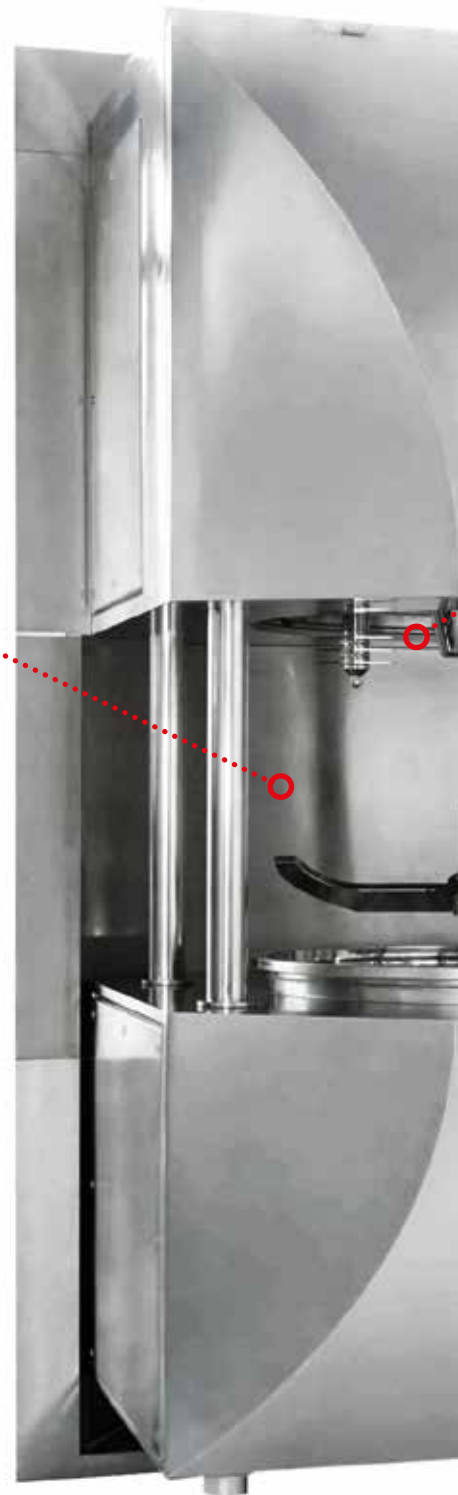


TDG principle

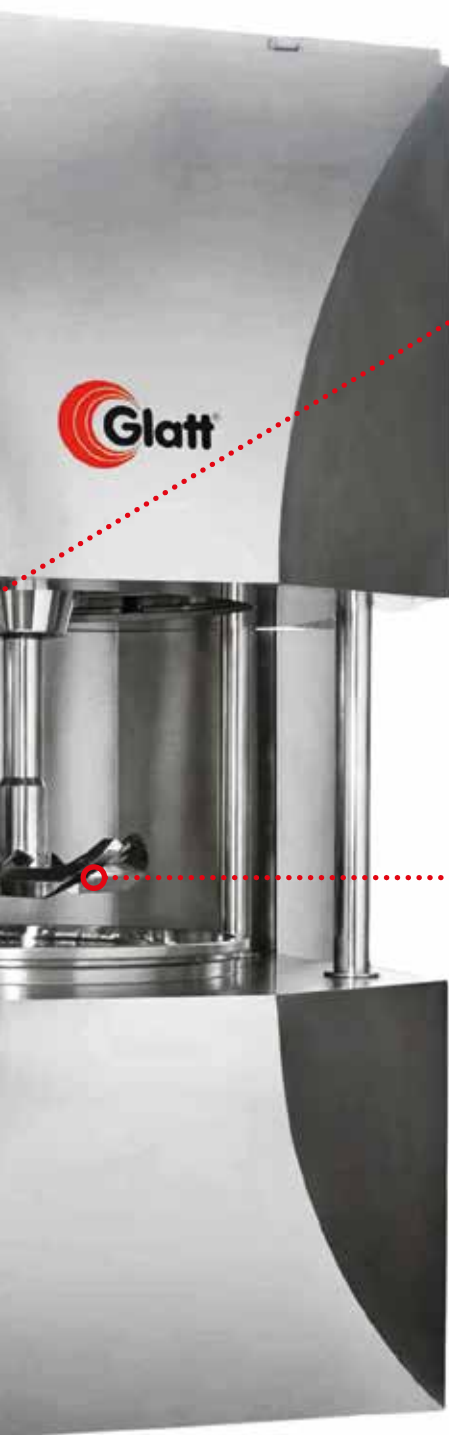


TDG 600

The sophisticated unit design stands out thanks to a modern look while setting standards in terms of GMP conformity. Furthermore, the practical installation of the TDG in the wall reflects GMP considerations. It not only saves space but also minimizes the number of components in the production area. A curved, cylindrical dish bottom guarantees optimum product movement as there are no "dead" corners. As with the VG, a vibration-free drive shaft ensures the best-possible gap between the dish bottom and the anchor rotor.



TDG 600



**Chopper in the working vessel lid**

This maximizes the product yield. The chopper contained in the cover can be incorporated into the process in different stroke positions. To provide optimum visibility into the process chamber, an illuminated camera is incorporated into the cover, transmitting images to the GlattView HMI. Thanks to its design as a CIP unit, even the standard version of the TDG is fitted with stainless steel filter elements in the outlet air filter. The automatically lowerable product bowl facilitates inspection after cleaning.



**Rotor**

The TDG is, for the most part, loaded and discharged when closed, either by gravity or by means of pneumatic product transport. Furthermore, a rotor mill can be incorporated after the discharge port to homogenize the granulate by means of a swivel mechanism. This ensures compliance with all requirements for containment application and for possible integration in complete granulating lines.



## VG & TDG PRO

In addition to the economical basic 2-bar versions, all Glatt wet granulators are available as PRO design. The key product advantage of the PRO design lies in the 12 bar pressure shock resistance with no need of peripheral safety precautions against explosive overpressure.

Thus the processing of product containing organic solvents is done without nitrogen inerting.

It doesn't matter thereby if you know the critical explosive specifications of your product or not. All known pharmaceutical products are covered by the PRO design.

Both VG PRO and TDG PRO are optimally configured for trouble-free integration in completely closed PRO granulation lines (wet granulator + wet sieve + fluid bed dryer) by Glatt.



VG PRO 100



VG PRO 600



TDG PRO bayonet lock



## SINGLE POT

### *Use and Principle*

If working with particularly high-activity substances, if no space for a fluid bed unit is available, frequent products changes are required or product loss is too high during product transfer, the use of a single pot system is an interesting alternative to a classic granulation train set-up, consisting of VG and fluid bed.

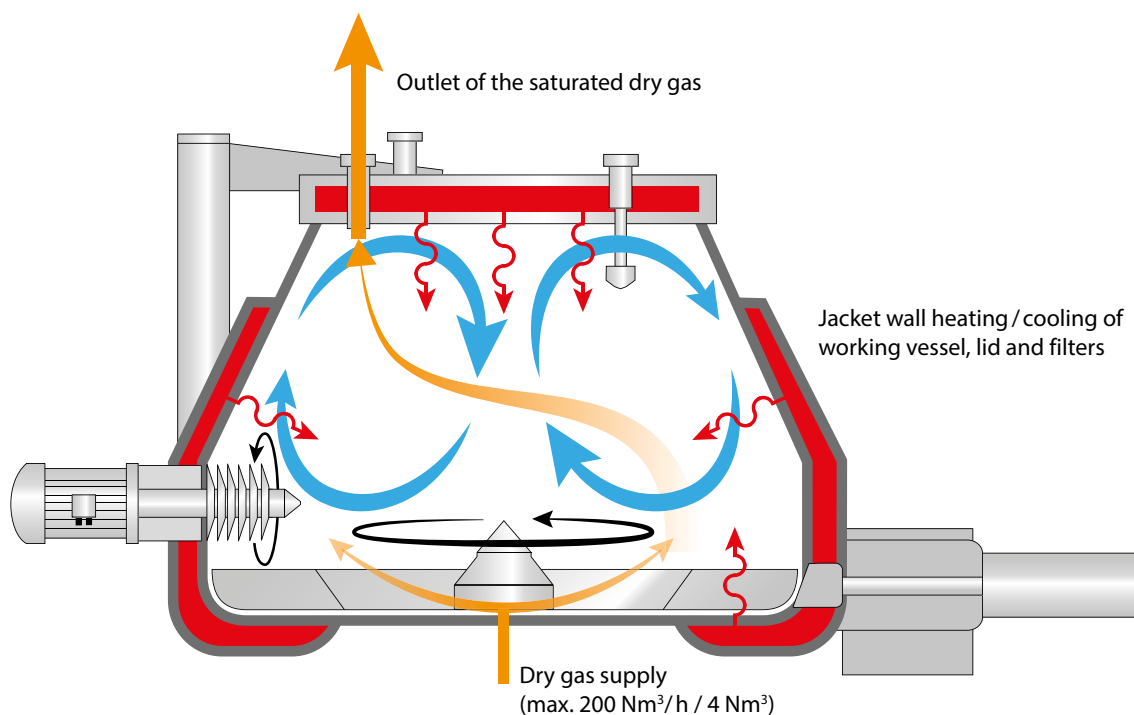
The mixing, granulating and final drying processes are carried out in one single unit. This makes it even easier to implement high containment and CIP requirements.

For the drying process, the VG or TDG is fitted with a vacuum pump system that can, if necessary, include solvent separators. The reduction in internal vessel pressure causes a reduction in the evaporation temperature, thereby ensuring gentle drying of the product.

This system is supported by jacket heating and the intake of carrier gas that can also be heated.



VG Pro 100 Single Pot

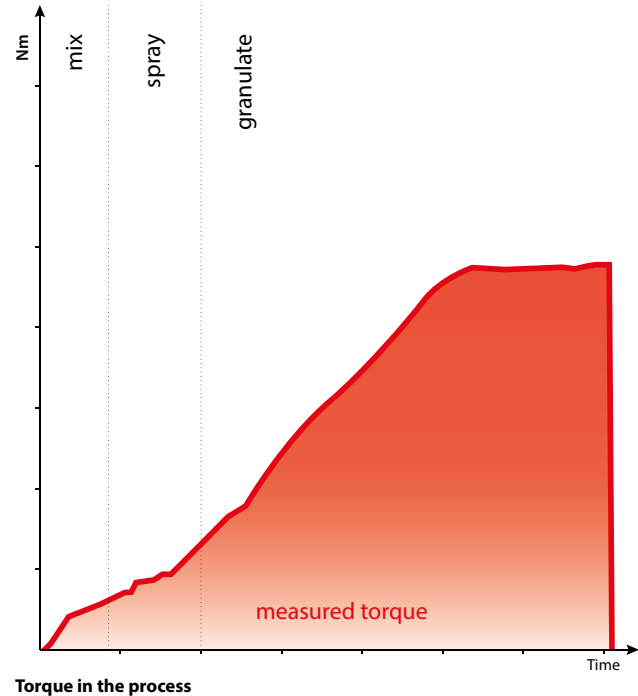


VG Single Pot Principle

## MEASUREMENT OF AGITATOR TORQUE

The energy required to turn the agitator is often used as an indicator to determine the granulation end point. Glatt has the ideal solution for every user and their different needs in determining torque. In addition to the power consumption of the frequency converter used as standard, the direct power consumption of the agitator motor can also be measured. Both variants are affected by energy transfer disturbance variables and the possible wear of mechanical parts.

Glatt therefore offers the possibility of adopting a contactless, calibrated torque measurement directly on the rotor. This solution allows the absolute torque of the rotor to be used to determine the granulation end point.



## CLEANING CIP/WIP

### *CIP - Cleaning In Place*

In recent years, CIP has become a key issue in the pharmaceutical industry.

Glatt defines a CIP process as a fully-automatic, reproducible cleaning process with a given cleaning result.

### *WIP - Washing In Place*

WIP includes thorough pre-cleaning followed by subsequent manual cleaning. In this case, you define the WIP yourself and we provide you with the adequate setup.

Both processes can naturally be validated. Glatt wet granulators are available in both the CIP and WIP formats. Naturally the corresponding cleaning racks are also included in our product portfolio



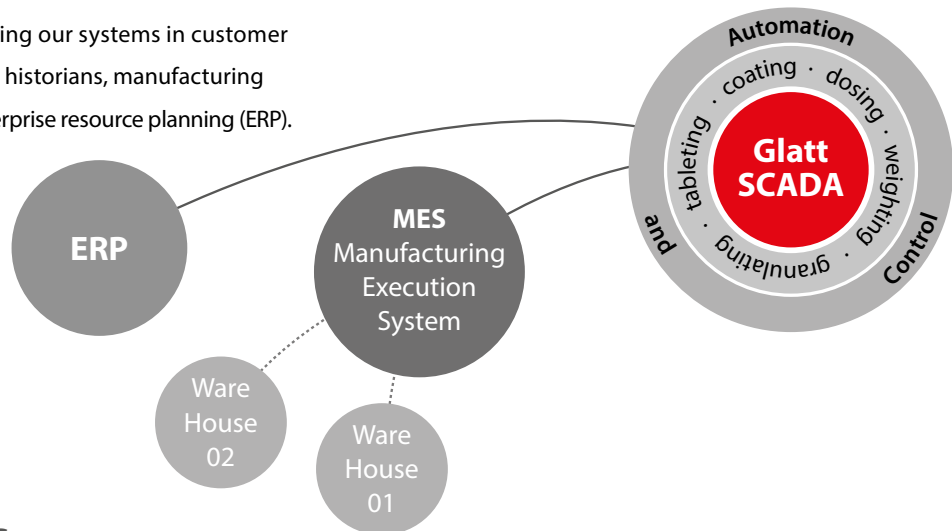
WIP rack



Cleaning nozzle

## INTEGRATION

We offer solutions for integrating our systems in customer networks and systems, such as historians, manufacturing execution systems (MES) or enterprise resource planning (ERP).



## CONTROL SYSTEMS

### *Many requirements. A true challenge.*

Glatt offers modern, future-oriented control systems. Their modular structure allows the use of individual system controls up to the integration of complete process lines and the connection of corresponding logistic and auxiliary processes.

The systems are consistently developed according to the GAMP directives. All systems with electronic records and electronic signatures (ER / ES) comply with the requirements of FDA CFR 21 Part 11. Explosion protection is a core competence of Glatt. For use in explosion-protection zones, Glatt offers ATEX-compliant solutions. At the same time, the control system must remain logical, clearly structured and as easy as possible to use for the operator.

### *Flexible. Take us at our word.*

Glatt develops, plans and produces the software and hardware for the control systems in-house. This results in a high degree of flexibility with regard to individual customer requirements: Glatt works with Siemens and Allan Bradley PLCs as a standard.

Other makes can be integrated if desired. We implement process visualizations with industrial standards such as GE Fanuc Intellution and Wonderware.

### *Validation and qualification.*

#### *Documented quality.*

As a professional and application-oriented partner, Glatt makes qualification a goal-oriented process. We work in compliance with the principles of GMP. Your equipment and control systems are qualified based on the GAMP lifecycle, which produces clearly structured documentation.



Control panel with GlattView Batch

### *One system. All possibilities.*

GlattView Batch provide intelligent solutions for complex requirements. With the intuitive GlattView Batch operating concept process management becomes easier and safer.

