

Special Edition



Tablet Packaging Safety

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Gossen Metrawatt supplies controllers which assure minimal temperature deviation – even in critical applications.



TLT 2600 Packaging Machine at Bayer HealthCare in Leverkusen, Germany

Filled up into tubes, or into small plastic or glass bottles, sealed in push-through blister packs or in plastic bags: Great demands are placed upon tablet and medication packaging, above all where safety is concerned. Beyond this, environmental protection also plays an important role in package manufacturing.

For quite some time now, Bayer HealthCare has been retrofitting various packaging machines in order to assure more ecological production. Retrofitting of this sort necessitates a great deal of know-how, and above all control technology is a complicated issue in this respect. Bayer HealthCare takes advantage of temperature controllers from Gossen Metrawatt which assure very minimal temperature deviation and a long service life.

So-called blister packs or push-through blister packs are one of the standard types of packaging used in the medications market. Tablets are inserted into individual blisters which are subsequently sealed with aluminum foil. This type of packaging is especially hygienic, and undesired influences such as high atmospheric humidity and contamination can be ruled out.

In general, foils made of polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), polypropylene (PP) and aluminum can be used for these packages. PVC foils make a significant contribution to quality, as well as to the price of push-through blister packs. Moreover, they demonstrate outstanding characteristics such as a resistance to chemicals, good workability, minimal shrinkage and a crystal-clear appearance. However, due to its chlorine content PVC is not entirely ecologically harmless: Dioxins may occur during production, and chlorine compounds may result in corrosion and harmful emissions during certain recycling processes, as well as during combustion for the generation of power in waste incineration plants.

As opposed to this, polypropylene demonstrates very good recycling performance. The production of foils made of this material has thus undergone significant development in recent years. Other favorable characteristics attributed to polypropylene contribute to this trend as well, for example its excellent barrier effect against water vapor, good thermal stability and the fact that it can be sterilized in autoclaves.

At Bayer HealthCare in Leverkusen, Germany, a company which packages the majority of its own medications, great importance has been placed upon environmental protection in the production process for many years. For this reason, the company has been using polypropylene for the production of tablet packages to an ever greater extent since the middle of the 1990s. However, this makes it necessary to retrofit existing production systems in order to make it possible at all to manufacture blister packs from polypropylene. "Large sums are being invested in order to change the production process over to environmentally friendly foils" explain the responsible parties at Bayer HealthCare. Strict production and cleanroom regulations specified for the pharmaceuticals industry apply not only to medication manufacturing itself, but rather to packaging as well.

One of the recently retrofitted systems is a TLT 2600 packaging machine. The system, which was supplied by Bosch Packaging and manufactured in 1993, is a compact machine of modular design which can be used in diverse applications, and is used at Bayer HealthCare solely for packaging solid materials such as tablets.

The material is no less difficult to process than it is environmentally friendly: Polypropylene foils are very sensitive and can only be formed within a narrow temperature range. For this reason, homogeneous warm-up and a uniform surface temperature are of great importance in the production process. This, in turn, means that the temperature controller plays a decisive role for the entire system!



Heating Platens for Homogeneous Warm-Up of the PP Foil



Blister Made of PP Foil

For many years now, the measuring instrument specialists from Nuremberg have been supplying Bayer HealthCare with controllers – to the customer's complete satisfaction. And for recent modifications to the machines as well, the company decided in favor of controllers from Gossen Metrawatt.

The controller had to fulfill two essential requirements:

- 1 Smooth approach to the setpoint temperature without overshooting when production is started up
- 2 Maximum temperature deviation of $\pm 3^{\circ}\text{C}$

Critical points within the production process include system start-up, as well as continuous load reversals. This means that energy is extracted from the heating platens in close proximity to the process while warming up the PP foil as a result of synchronous operation of the system, as well as cyclical opening and closing of the heating platens. At the same time, temperature overshooting must be avoided when the machine is at a standstill, because the physical characteristics of the PP foil demonstrate only a minimal temperature range within which forming must take place ($\pm 3^{\circ}\text{C}$).

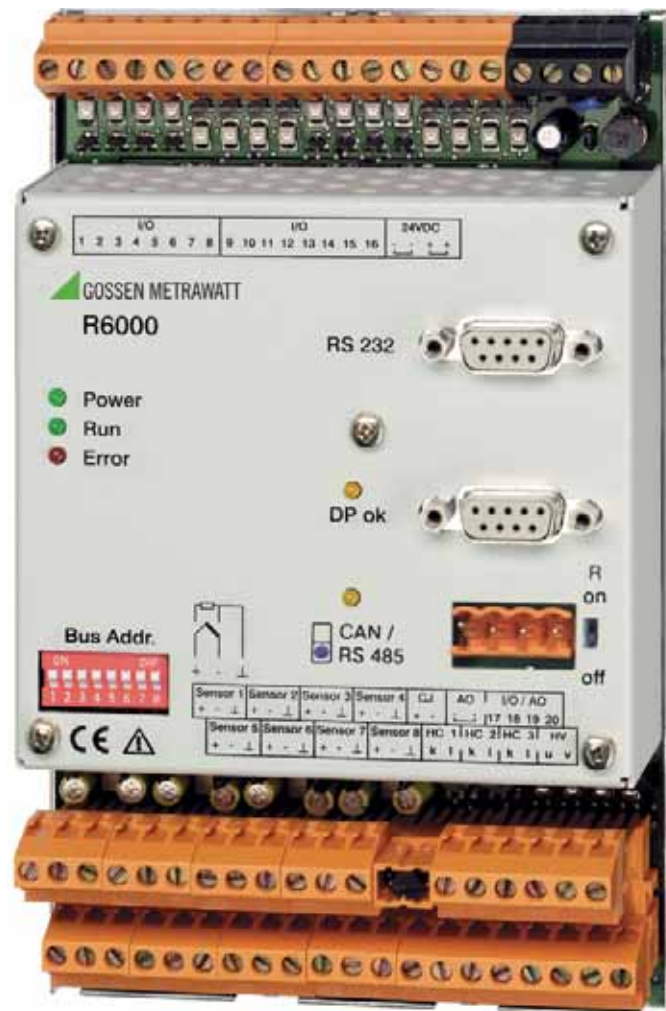


Stand-Alone Solution: Autonomous R6000 Controller and Control Terminal

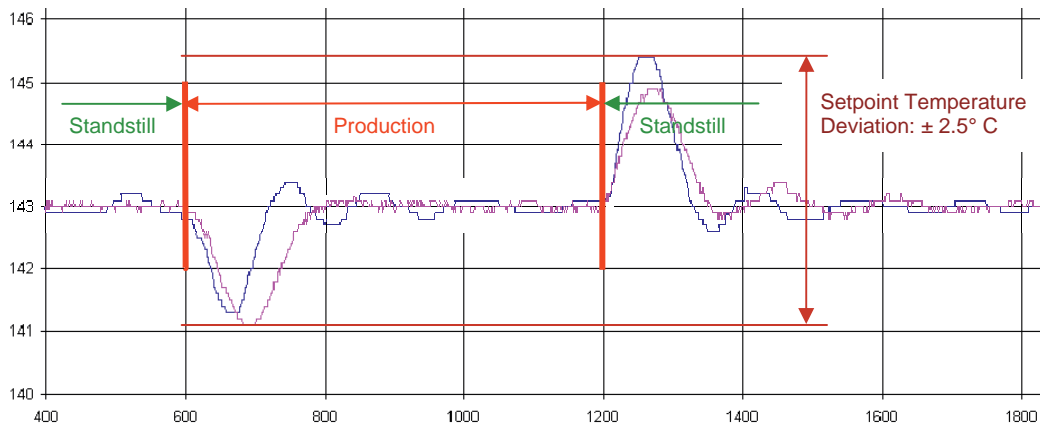
The solution developed by Gossen Metrawatt in accordance with customer requirements consists of an R6000 eight-channel temperature controller and a 10.4" control terminal. Both components were set up as a so-called stand-alone solution, and are thus independent of the system controls. The controller can be configured and adapted to the control systems by means of self-tuning within a very short period of time. Outstanding control performance is achieved by means of GOSSSEN METRAWATT's own dead-beat PDPI algorithm. It became apparent at Bayer HealthCare that the controller itself provides outstanding results, even for critical applications. The measurement inputs are connected to Pt100 resistance thermometers which were distributed over the heating platens in a special array. The outputs are connected to commercially available solid-state relays.

The integrated data logger is an important function for quality management. It records all actual values and setpoints during a freely selectable time period within a range of six minutes to twelve days, making it possible to quickly retrace deviations. This also includes an alarm history for error status entries with time stamp, as well as alarm value reporting.

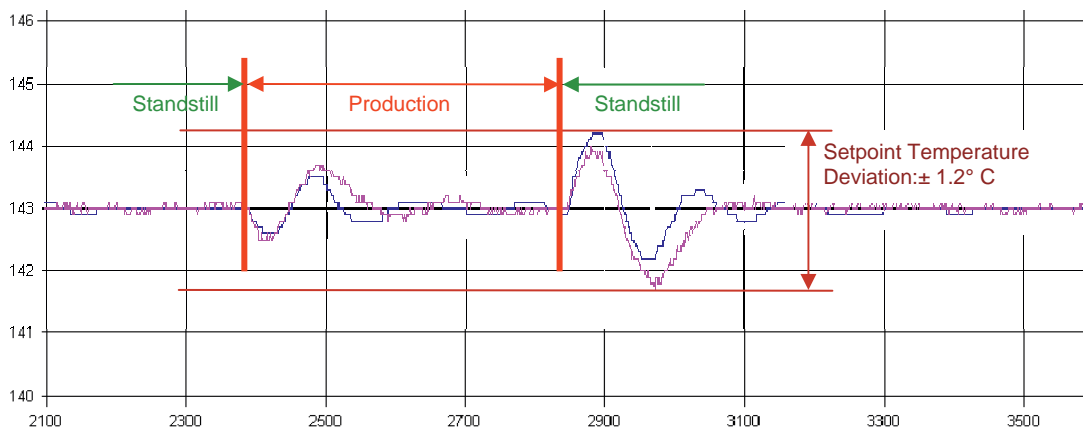
The control terminal for visualization of the measured value provides production employees with a convenient way of reading and observing momentary values at a glance. The terminal is connected to the controller via its Modbus interface. The user interface at the terminal was created and adapted by Gossen Metrawatt especially for the R6000 controller.



The entire system was placed into operation within a single day at Bayer HealthCare. The results were excellent: The machine was started up without overshooting, and temperature deviation during load reversal from standstill to operation was approximately $2\frac{1}{2}^{\circ}\text{C}$. In order to reduce deviation even further, feed-forward control was additionally configured: A binary “operating” signal manages the controller’s working point, resulting in temperature deviation of only 1.2°C during load reversal.



Temperature Curve for Channels 1 and 2 Without Feed-Forward Control: $\pm 2.5^{\circ}\text{C}$



Temperature Curve for Channels 1 and 2 With Feed-Forward Control: $\pm 1.2^{\circ}\text{C}$

Above quick arrival at an agreement in favor of mutual initial start-up, the clear-cut wiring layout for the periphery around the R6000, simple initial start-up, self-tuning and warm-up without overshooting were very convincing during the course of the current retrofitting project. Beyond this, no additional controller parameter has to be set.

Basic requirements specified by Bayer HealthCare which must be fulfilled by service providers like Gossen Metrawatt: “If there’s a problem, we think in terms of minutes and hours, not days or weeks. We expect quick, reliable support, for example the provision of a replacement controller in the event of a failure. Mutual initial start-up and employee training prior to and during difficult projects is also an important aspect for us.” In addition to trouble-free initial start-up and outstanding results, the responsible parties at Bayer HealthCare also place great importance on after-sales support.

A display package – commonly known as a blister pack – is a product package which makes it possible to see the packaged object. The bottom part of the blister pack consists of a base web made of foil or sheet material, into which one or more blister-shaped recesses have been formed. The recesses into which the product is inserted are known as cavities. The cavities are sealed with a cover foil. Blister packs are above all suited for packaging small individual parts in single portions. They've been used successfully for more than 35 years as packages for solid (pressed) medications.

Blister packs protect medications from environmental influences such as atmospheric humidity, oxidation and microorganisms, as well as mechanical influences during transport. In addition to this, they allow for easy ingestion of tablets directly from the package. Standard push-through blister packs consist of a thermo-formed, thermoplastic base web and a cover foil. PVC, PVDC, PP or aluminum is usually used for the base web.

Michael Roick, Nuremberg, 19 September 2007

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Sicherheit durch Kompetenz



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