

USER REPORT

Kremsmünster + Kottlingbrunn/Austria – November 2013



Photo: Wittmann Battenfeld

Fig. 1: 80 per cent of Kunststoffwerk Kremsmünster's production consists of pharmaceutical packaging. An important line within the product portfolio is dosage spoons for liquid medication.

Efficiency 30 million times

That the correct dosage in medicine makes all the difference between a healing remedy and a deadly poison has been common scientific knowledge ever since the discoveries made by the mediaeval physician Theophrastus Bombastus von Hohenheim, commonly known as Paracelsus. Consequently, precise dosing aids are important tools in pharmacy. The Upper Austrian company Kunststoffwerk Kremsmünster (KWK) has specialized increasingly in this market segment during its more than 60 years of existence. It supplies a wide range of dosage systems. To step up its dosage spoon production, KWK chose the all-electric injection molding technology from Wittmann Battenfeld. The new production cell, consisting of an *EcoPower 110/35* injection molding machine, two W832 linear robots from Wittmann and an automatic packaging

station, has impressively demonstrated its efficiency during its first year in production by churning out more than 30 million dosage spoons.

Roughly 80 per cent of the injection molding products manufactured by the family-owned, Upper Austrian company KWK (Kunststoffwerk Kremsmünster) are primary packaging components for the pharmaceutical industry. The portfolio includes closures for glass and plastic bottles, with or without tamper evidence rings, with or without integrated desiccants, dropper nozzles, sealing liners, pouring spouts and dosage syringe adapters, as well as dosage spoons, dosage cups and cream jars (Fig.1).

Dosage spoons – a high-precision product

Dosage spoons are used for dosing liquid substances such as antibiotics or cough mixtures, and one is added to every package. They remain in use until the package is empty, consequently they are one-way products adapted to specific applications, which are manufactured in large quantities. The main requirements for the products based on these facts are: the minimum technically feasible material consumption, maximum efficiency in production and, last but not least, high precision in volume and design accuracy. Dipl.-Ing. Georg Weiermair, graduated engineer and Technical Manager, comments: “When we were faced with the decision to invest in stepping up our production capacity for 5 ml spoons, our most important size, we saw this as an opportunity for a comprehensive re-engineering project. Our aim was more than just purchasing an additional injection molding system, while maintaining the existing technical standard in product design and parts logistics. Our intention was to achieve the production increase with just a single system, by means of consistent exploitation of existing efficiency potentials.”

The exploitation of efficiency reserves started with product design. The first criterion was that it had to become “faster”, i.e. wall thicknesses, flow channels and the choice of material had to be reviewed. The process window of the injection molding process was also to be made both wider and more stable, with a simultaneous further improvement in product quality. This agenda was the starting point for comprehensive design optimization, filling and cooling simulations and, of course, practical tests. The end result is a 5 ml dosage spoon made of PP with a length of 90 mm and a part weight of just 1.8 g. The completeness at the final point of the material flow, the tip of the spoon, was defined as an indirect criterion for good product quality. Product quality was to be ensured by the precision of the injection molding machine, but also to be monitored 100 per cent by optical sensors in the end-of-arm tooling of the parts removal robot (Fig.2a+b). Another quality attribute which, however, is not so easy to monitor online, but can be effectively controlled

with an efficient tempering system, is the straight, warpage-free form of the spoon. It is a prerequisite for stable parts stacking by peripheral downstream equipment.

High-performance, thin-wall injection molding with electrical precision

After the homework had been completed in product design and the in-house mold-making shop had been commissioned with building a 12-cavity mold, the next step was to select a partner for the injection molding technology and automation equipment for parts handling up to transport packaging. Weiermair, the Technical Manager, explains what this involved: “In fact, we knew from the process simulation that a cycle time of about six seconds would be possible. Accordingly, the machine technology and the automation system in particular should be able to handle the 600 production cycles per hour with an output of 12 parts per cycle in continuous operation. And it had to perform this task with a higher degree of precision than the machine we had used previously. The decision made easy in the case of machine technology. We needed a machine with either an all-electric or a partly electric drive system – but which one?”

Wittmann Battenfeld scores with best automation concept

“Three brands of machines were short-listed, of which each had shown the required performance. On that score, the actual choice of supplier could have been left to the purchasing department. However, the selection of the right automation equipment proved not quite so easy”, Georg Weiermair recalls.

The actual automation task for the production of such a “simple” spoon proves to be surprisingly complex, since the required specifications already start with depositing all 12 molded parts in separate stacks “according to cavities”, and that with freely adjustable stacking heights ranging from 100 to 160 units. Hence, the above-mentioned requirement of a warpage-free, strictly straight form for the spoon (Fig.3a+b). On reaching the pre-set stacking height, the full stacking container had to be replaced automatically by an empty one. Each of the twelve stacks of dosage spoons was to be removed individually from a separate parts removal position and transferred to a tube bag packaging system by an additional handling device (Fig.4). Immediately afterwards, the dosage spoon packages were to be inserted into transport or storage boxes, also fully automatically and space-optimized by mirror-inverted positioning of each layer (Fig. 5).

This was no routine task. Especially the synchronization of performance between the machine and peripheral equipment, and the process and capacity planning it

required, demanded close cooperation between KWK and the machine supplier's automation engineers. Georg Weiermair once more: "When all concepts and quotes were on the table ready for decision-making, we very soon realized that the engineers from Wittmann had done an excellent job. The very compact equipment layout as well as the individual detail solutions tipped the balance in their favor."

The Wittmann Battenfeld Regional Sales Manager Wolfgang Glawatsch also looks back with some pride: "This particular case demonstrates that Wittmann's automation competence provided the decisive arguments which led to KWK acquiring its first Wittmann Battenfeld injection molding machine."

Expectations fully met

The production cell, consisting of an *EcoPower* 110/750 injection molding machine (110 tons clamping force / 750 injection unit with a 40 mm L/D 22 screw) combined with a Wittmann W832 UHS (ultra-high-speed) linear robot for fast parts removal, a further W832 stand-alone robot for finished parts handling, and the packaging system positioned parallel to the machine's non-operator side, was delivered in December 2012. Since January 2013, it has produced more than 30 million 5 ml dosage spoons. In this way it has fully come up to expectations, as has been confirmed by KWK's Managing Partners Ing. Dkfm. Eberhard Habermann and Ing. Mag. Manfred Habermann in their résumé (Fig.6).



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About WITTMANN BATTENFELD



WITTMANN BATTENFELD, a company of the WITTMANN group, is a leading manufacturer of injection molding machines for the plastics industry, with its headquarters and production plant in Kottlingbrunn / Lower Austria and its own sales and service companies as well as representations in 60 countries worldwide. The production program comprises the complete range of injection molding machinery from micro injection molding machines to large machines with 1,600 tons clamping force, including vertical machines and multi-component injection molding machines. Comprehensive application technology packages round off the product portfolio, which is complemented by the range of robotics and peripheral equipment offered by Wittmann.

Please visit www.wittmann-group.com for more detailed information.

about Kunststoffwerk Kremsmünster



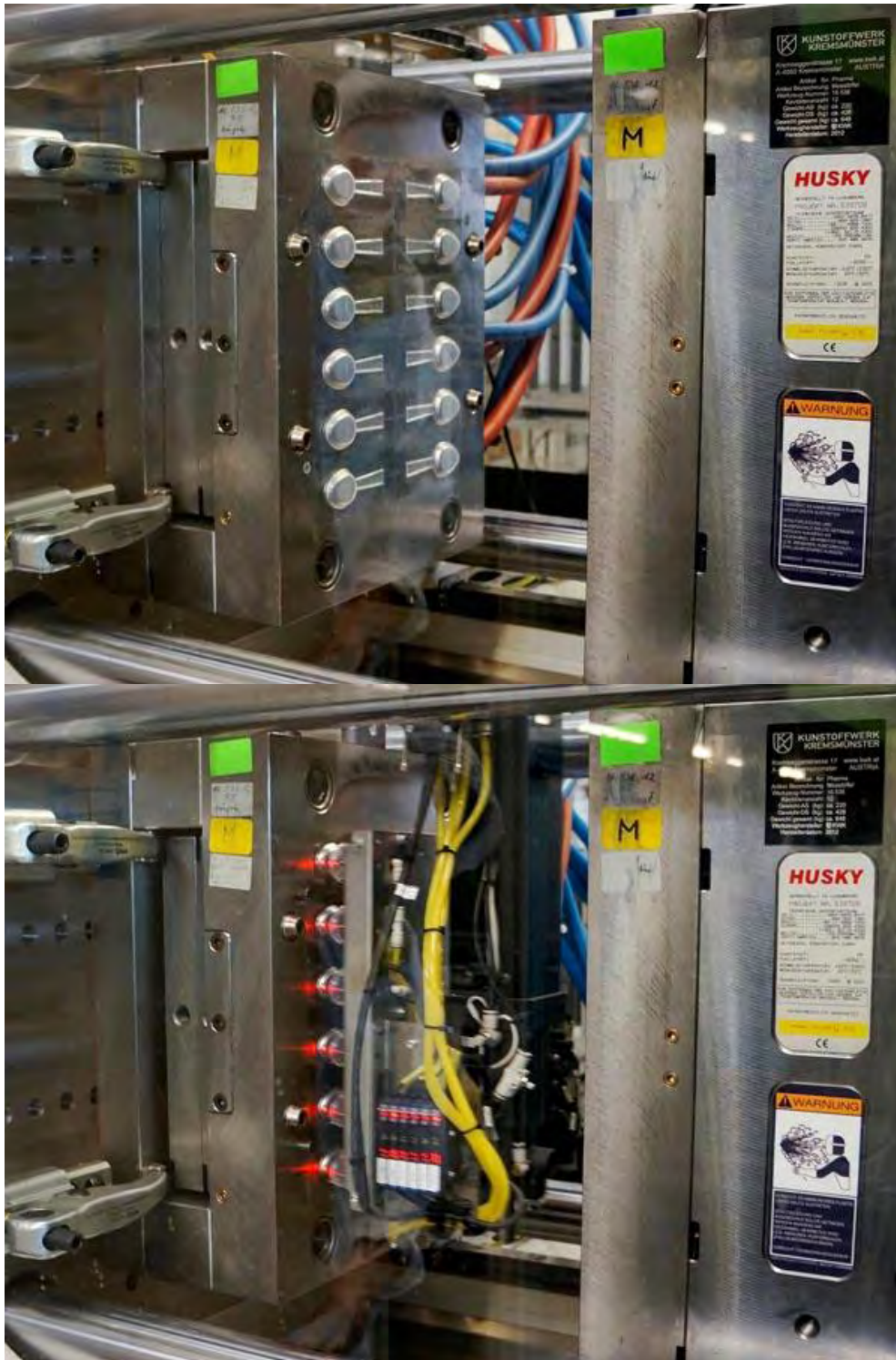
The injection molding company, founded in 1950 and managed by the Habermann family since 1978, has been dedicated to the production of closures from the very beginning. While in its early years it produced primarily closures for food and beverage bottles and body care products, but also motor oil containers, 80 per cent of today's production on 35 injection molding machines with clamping forces ranging from 80 to 250 t consists of pharmaceutical packaging.

The extensive product portfolio starts with standard types of GL 14, GL 18, PP 28 and PP 31.5 closures for both glass and plastic bottles, with or without tamper evidence rings and including child resistant closures. A special field of expertise is the development of functional bottle inserts for accurate dosage of medicines, such as droppers or pouring spouts.

The standard range is complemented by closure systems developed for specific products, such as systems with integrated silica gel inserts to keep hygroscopic medicinal powders dry, or dosage syringe adapters. 18 assembly lines are available for component assembly. The stringent demands from the respective customers are met with attributes such as clean-room production or ISO 15378 certification (for manufacturers of primary pharmaceutical packaging).

More detailed information under www.kwk.at

Illustrations



Photos: Wittmann Battenfeld

Fig. 2a+b: Extensive re-design of the molded part, including fine tuning to optimize cavity filling, and 100 per cent monitoring of the molded parts via sensors inside the robot gripper were the prerequisites for accelerating the production.



Photos: Wittmann Battenfeld

Fig. 3a+b: A warpage-free, straight spoon contour (3a) is the prerequisite for stacking 130 or, alternatively, 160 parts in each of the parts container units at the rear of the machine. The parts are stacked separately in 12 containers according to the number of cavities. The stacking container station comes as a twin model which can be rotated by 180 degrees.



Photo: Wittmann Battenfeld

Fig. 4: A second handling device removes the stacks one by one from the full stacking station and inserts them into the tube bag packaging station.



Photo: Wittmann Battenfeld

Fig. 5: Immediately after completion of tube bag packaging and following a gripper change, the handling device No. 2 picks up the packaged dosage spoons again and transfers them to a transport box.



Photo: Wittmann Battenfeld

Fig. 6: KWK Managing Partner Ing. Dkfm. Eberhard Habermann, Wittmann Battenfeld Regional Sales Manager Wolfgang Glawatsch, KWK Managing Director Ing. Mag. Manfred Habermann and the Technical Manager Dipl.-Ing. Georg Weiermair look back on a year of successful, continuous operation with an output of 30 million high-precision dosage spoons.