ENGINEERING EXCELLENCE
OPTIMAL PRODUCTION CONDITIONS
FOR PLASTIC BUTTERFLY VALVES

In the field of technical solutions, there are always challenges that require innovative approaches. Our most recent success story concerns the development of a plastic butterfly valve that is specially designed for use in hot water circuits for wellness spas. These butterfly valves enable safe and reliable control of the water supply to the wellness bathtubs and shower areas in a leisure pool.

The following operating parameters were key to the design of the GEMÜ 423 butterfly valve made of PP-H:
Medium: Hot water and clean water
Operating pressure and temperature: 2.5 bar at 80 °C

There were other criteria that needed to be taken into account. The material resistance at high temperatures was crucial. The butterfly valve was created using PP-H plastic, which is not one of the standard materials for GEMÜ plastic butterfly valves. The valve design also needed to enable welding in order to minimize leaks. Additionally, the valves needed to operate with electrical actuation in order to prevent noise in the leisure baths due to air compressors. Electric valves operate without compressed air and therefore constitute a quiet and practical solution.

The engineering process

The engineering process was the key to this success story. For the first time, a simultaneous engineering approach was used in close collaboration with the GEMÜ Plastic Technology Center. A wide range of simulations and tests enabled the design of the butterfly valve to be optimized to establish ideal production conditions. This was particularly important because this component was a custom-made product.

An efficiency test was carried out before production started. In order to be able to offer the butterfly valve in the material PP-H, it was necessary to select a manufacturing process that provided excellent results in terms of both cost-effectiveness and production quality. Two options were available for this: A pure machining process with a production time of 30 minutes, or an injection moulding process that requires just 3 minutes as well as reworking involving approx. 3 minutes of machining. The resource consumption also offered impressively low resource consumption, as the pure machining process involved the removal of substantially more material.

Step 1: Feasibility

A feasibility study was carried out at the outset of the project. Normally, butterfly valves such as these are manufactured from PVC using an injection moulding process, whereas manufacturing from PP-H represents a particular challenge. The mechanical differences required a wide range of simulations performed by the GEMÜ Plastic Technology Center as well as additional in-house tests for leak-tightness and ensuring component strength.

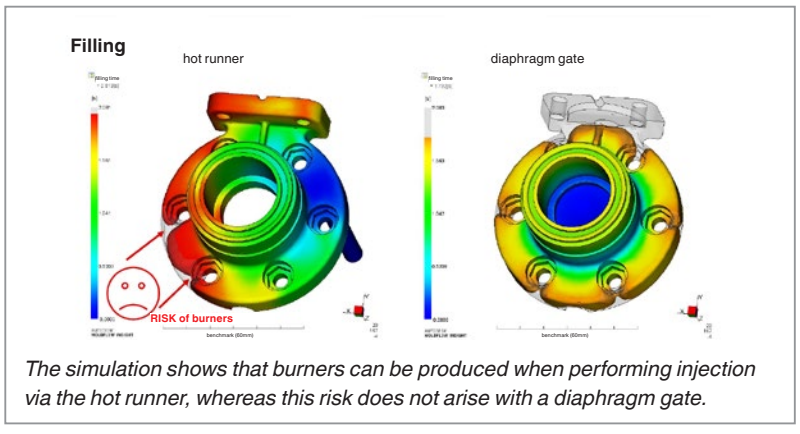
Step 2: Prototype development

A machining process was used for prototype development in order to ensure that a butterfly valve made of PP-H operates in the same way as one made of the standard material PVC. Leak-tightness and burst pressure tests were performed in-house with successful results.

Step 3: Simulations for changing the manufacturing process

The injection moulding process was selected for series production, as it is more cost-effective for high quantities. Simulations by our Plastic Technology Center helped to develop the ideal design for the injection moulding process. It was ensured that the injection mould was optimally filled during the injection process, which prevented burns. Based on the simulation results, the diaphragm gate process was chosen. This enabled the GEMÜ 423 butterfly valve made of PP-H to be offered to the customer at an attractive price. It is now used in a leisure bath in France to control the hot water supply.

„"We are proud of our in-depth design and manufacturing capabilities. This success shows that we are able to offer customised solutions at a cost-effective price point. Our customers benefit from our ability to use tests and simulations to flexibly establish the optimal production conditions and adapt tools to suit specific production processes. We are more than just a manufacturer – we are a partner for customised solutions," reports Kevin Sifer, Team Leader Projects and Design, Industry business unit.
This success story exemplifies the GEMÜ passion for engineering and innovation. The GEMÜ Team looks forward to the next challenges.



The simulation shows that burners can be produced when performing injection via the hot runner, whereas this risk does not arise with a diaphragm gate.

GEMÜ 423 made of PP-H in the hot water circuits of wellness bathtubs