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A clean performance

Optimised plain dutch weaves in an industrial laundry

Industrial laundries use as much water in a single day as two families of four do in a whole year. A laundry in Simmern, Germany, which processes around 60 tons of laundry from hospitals, nursing homes and old people's homes per day, is one of these major consumers. As is generally the case in this energy-intensive sector, electricity, gas and water consumption play a crucial role in the company's economic efficiency and environmental compatibility. For many years now, this industrial laundry has ranked as one of the pioneers among industrial laundries in terms of environmental protection at operating level. The company works consistently to reduce its energy consumption in order to ensure its competitiveness and to reduce its impact on the environment. One means to the end is the rotary drum filter made by the company Aquastream that the laundry has been using since 2008. With this state-of-the-art technology, the industrial laundry has managed in three stages to reduce its fresh water consumption by well over a half. This significant improvement is due in no small part to optimised plain dutch weaves (ODW) made by GKD – Gebr. Kufferath AG. With their absolute mesh size of just 35 µm, they reliably retain even the finest of particles from a daily throughput of 150 cubic metres of dirty water, thus enabling the cleaned water to be recycled for laundering in the continuous batch washer.

There are not many places where so much soiled laundry is regularly washed as at the industrial laundry in the Hunsrück in Germany. Founded in 1950, today this industrial laundry ranks Europe-wide as one of the model companies in its sector. 60 tons of soiled linen arrive here every morning and



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leave the laundry in the evening washed, ironed and folded. "On average we process 150,000 items of linen here every day," says the general manager. This is possible thanks to highly automated processes and 150 employees who, at the highest quality level, move almost unimaginable mountains of laundry. The laundry items are transported through the processing stages by a sophisticated conveyor system that performs most of its duties over the heads of the staff. Process-control and monitoring ensure that none of the items get lost on the way and that they are all returned to their owners, washed and ironed, within the day. The first step is to pack the items of linen into sacks and code them. These sacks are transported per lift onto their circuit over the machines, where they move purposefully along as if by magic. The first stop is at the three, 20-metre-long continuous batch washers, each of which has 21 chambers for prewash, wash and rinse cycles. Here the sacks release their contents into enormous hoppers. Every 90 seconds, the batch of laundry is passed on to the next washing chamber by a full rotation of the chamber, which otherwise only has a pendulum movement, and washed at up to 80 °C. An average wash cycle runs for 32 minutes. After three rinse cycles, the 50-kilogramme load is pressed into a flat cake of linen which is transported, without a spin cycle, directly into the dryer. Just 15 minutes later, the dry linen is sorted by hand ready for the subsequent processing stages. Loaded into a new set of automatically guided transport sacks, the batches are then passed on to the respective ironer line. Here, covers, sheets and surgical clothing like gowns or trousers are hung per hand on the clips or hangers of the conveyor system. They then pass in sequence through a range of ironers, where they are also directly folded.



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High precision and mechanical strength

The process is easy to follow in principle, but in practice it represents a veritable masterpiece of plant engineering and logistics. Maintenance of quality, optimisation of energy consumption and thus also of efficiency, however, are things that mainly take place behind the scenes. Frequent wash cycles with ever-decreasing amounts of water, necessitated by cost factors, put an enormous mechanical load on the linen that leads to wear and build-up of lint. White lint pills on green or blue surgical garments, for example, would certainly give cause for complaints from the industrial laundry's customers, and must be avoided. Furthermore, fresh water consumption has to be reduced as far as possible through efficient process water treatment. These are two key tasks that the Aquastream rotary drum filter masters with outstanding success. The machine is manufactured by the Austrian company Aquastream, which is headquartered in Ludesch, about 40 kilometres south of Bregenz. Aquastream was founded in 2007 by Peter Bitschnau. The cutting-edge technology of the Aquastream Filter they developed has proven itself time and again in a range of applications in various industrial sectors. The compact filters are used successfully not only in the textile, food-processing, beverage, plastics and rubber industries, but also, and primarily, in industrial laundries and dyeing works. Their small-footprint, self-cleaning drums ensure a high throughput rate without production downtimes. For the screens of the drum filters, Aquastream relies on optimised plain dutch weaves made by GKD – Gebr. Kufferath AG. Their special mesh structure facilitates separation rates down to the range of 10 µm. Due to their slot-shaped pore geometry on the mesh surface, whose openings are smaller than the pores inside the mesh, particles above the specified cut point are reliably retained there. In contrast, smaller particles pass easily through the internal pores without clogging them. This specific mesh construction is the reason for the extremely high dirt holding capacity



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of ODWs. Thanks to the weaving technology used by GKD, the application-specifically configured mesh geometry can be reproduced at any time with maximum precision. ODWs combine this precision of retention rate and pore geometry with a characteristic low tendency to clog, which, for example, makes them vastly superior to plastic meshes in microfiltration applications. In addition to their high permeability in spite of their fine pore size, ODWs are also convincing in terms of their good cleaning properties. The mesh construction of high-quality 1.4404 stainless steel guarantees levels of corrosion-resistance and mechanical stability that are unmatched by other filter media with comparable throughput performance. For Peter Bitschnau, it is this exceptionally broad range of qualities that makes them the filter media of choice for his Aquastream Filters, in which screen drum cleaning is effected without the use of compressed air.

Efficient, space-saving and low-maintenance

The washing water circulates in an open system and has to be regularly cleaned of foreign substances like lint and hair. With a drum diameter of 600 millimetres and a drum length of 300 millimetres, each Aquastream machine at the industrial laundry filters 15 cubic metres of washing water per hour, amounting to a daily throughput of 150 cubic metres. In all, four latest generation machines are installed at the laundry. Three of them operate in the continuous batch washers in chambers 13 and 14 – i.e. directly after the main wash cycle and before the rinse cycles. The fourth filter is connected to the washer extractors for special laundry, where it even filters as much as 20 cubic metres per hour. The low-maintenance machines operate without the addition of consumables, which cuts out the costs for their procurement and disposal. Compared to a conventional five-cubic-metre quartz sand filter, the Aquastream with its footprint of just one cubic metre is exceptionally space-saving. Nevertheless, in most cases – including at the industrial laundry –



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sedimentation can be dispensed with. Moreover, the selected filter fineness of 35 μm reduces the contamination of the process water with settleable solids and heavy metals. The Aquastream equipment at the industrial laundry filters out heavy metals, for example, to such an extent that the laundry has no problems complying with the applicable standards. This is possible due to the natural tendency of heavy metals to attach themselves to carriers like lint. These particles are reliably retained by the optimised plain dutch weave filter mesh – a massive advantage over the courser filter media usually deployed in this area. While the drums of other manufacturers have to be cleaned daily in a lengthy process because their double screens are clogged, thanks to their self-cleaning screen drums Aquastream Filters run in uninterrupted operation. The low-odour lint screen only needs to be emptied once a week. Cleaning of the Aquastream Filter machines is performed without production downtime using 6 bar pressure through integrated spray bars that are fed with water. To reduce their water consumption, as of December 2014 the industrial laundry is now using the latest generation of Aquastream machines, which feature two spray bars that continuously clean the drum and an electronic control system. This intelligent controller regulates the removal of lint and dirt in such a way that only a few litres of water per day are needed. But the main challenge in the process is the required fineness of the 35- μm screen, which must combine reliability of the specified cut-point accuracy with the mechanical robustness demanded by a continuous throughput of 150 cubic metres of medium per day. "Apart from GKD there is hardly a single manufacturer that can do that," says Peter Bitschnau. In his experience: "As a rule, companies only offer filter finenesses in ten- μm intervals, and that only starts at 60 μm ." In all other respects, his comparison with other mesh screens also clearly favours the ODWs: "No other mesh is so easy to clean and so mechanically robust." He also views GKD's all-round engineering competence as a further advantage.



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The combination of their own laboratory, wide-ranging process experience, their own development department, mesh manufacturing and finishing all make the technical weaving mill a valued solutions partner for Aquastream. "GKD produces screens that actually do fulfil all the requirements we set," says Peter Bitschnau. In collaboration with GKD, he customises the configuration of the filter media specifically to the requirements of the particular customer. For this, water samples are taken over a whole week and thoroughly analysed to ensure that the mesh design reliably caters for all possible laundry batch related fluctuations in particle size. GKD and Aquastream are also working closely on the continuous optimisation of the wire strength for the Aquastream Filter screens: the finer and at the same time more robust the mesh is at higher throughput rates, the better. Parallel to this, GKD has also developed a mounting system for the rotary drum filter that makes the installation of the screen drum easier for customers like the industrial laundry. But, for Peter Bitschnau, one key factor for the success of optimised plain dutch weaves in water processing is also the rapid response he can rely from GKD and the wide range of ODWs with mesh sizes from 10 µm to 80 µm. So equipped, Aquastream Filters are suitable for both pre-filtration and post-filtration in wastewater treatment plants. "The competition can't offer such flexibility – either because they can't achieve this degree of filter fineness, or they can't match this throughput rate, or quite simply because they are too expensive," he explains.

Over 50 percent lower water consumption

Since December 2014, the industrial laundry has been using the third, now decentrally controlled generation of the Aquastream 1.5 Rotary Drum Filter to clean all the washing water and system water of its industrial laundry in Simmern. While the aim in acquiring the first machine back in 2008 was simply to improve the water quality by removing lint and hair, just one year



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later the industrial laundry decided to deploy four second generation Aquastream Filters to also filter the system water. In this way, the company was able to reclaim a huge volume of service water and significantly reduce its fresh water consumption. The third generation with its decentralised automatic controller is now reducing water requirements even further. The results speak for themselves. Before the deployment of Aquastream Filters the industrial laundry was using 14 litres of water per kilogramme of laundry. With the first filter generation this dropped to 9 litres, with the second generation to 5.5 litres, and today the company is only using 3 – 3.5 litres of water per kilogramme of laundry. And the industrial laundry's customers also have every reason to be happy, because with absolutely lint-free linen their highest expectations are being completely fulfilled.

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GKD – GEBR. KUFFERATH AG

The owner-run technical weaver GKD – GEBR. KUFFERATH AG is the global market leader for metal and plastic woven solutions as well as transparent media facades. Under the umbrella of GKD – WORLD WIDE WEAVE the company combines three independent business units: SOLID WEAVE (industrial meshes), WEAVE IN MOTION (process belt meshes) and CREATIVE WEAVE (architectural meshes). With its six plants – including the headquarters in Germany and other facilities in the US, South Africa, China, India and Chile – as well as its branches in France, Great Britain, Spain,



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Dubai, Qatar and worldwide representatives, GKD is never far from its customers.

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