

Junkers & Müllers: Environmentally Friendly Washing - A Field Report

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At the start of 2009, the technical textiles specialist from the Lower Rhine region invested in a new high-performance washing range from Benninger AG. With the aid of integrated consumption data indication and intelligent control technology, waste water and energy efficiency can be greatly optimised.

The concepts of the 'water footprint' and the 'carbon footprint' have long since arrived in textile manufacturing plants. While the subject of waste water has long been established as the Achilles' heel of wet finishing, today it is becoming more and more important to consider this subject within the wider context of the full production process. The focus here is on process optimisation, which is mapped via intelligent data management. The result: transparent sub-steps which can be individually adapted to varying situations and conditions. Solving such complex challenges is only possible with close cooperation between the customer and the supplier. In this article, we take a look at how such a project needs to be implemented; both in terms of the sequence of steps required and in terms of what needs to be covered in each step.

At the start of any good project is a well-conceived requirements specification. This is the same here: everything needs to be considered, including all of the production-relevant parameters ranging from the processes, products and characteristic features, via production safety and automation, preparation/dosing, cleaning and efficiency to closed-loop control parameters and ease of servicing/repairs. Of course, this already raises the bar quite considerably.

From the point of view of the machine constructor, the advantage is that all tasks are clearly outlined, and the dialogue with the relevant contact persons takes place at the same level. On the other hand, the customer can relax in the knowledge that every single point will be meticulously worked through and optimised in the best possible way for the given production parameters (portfolio, space availability, surrounding area/environment). In this case, the following processes are to be implemented in the washing machine:

- Washing after cold bleaching
- Washing of water soluble size
- Washing of non-water soluble size
- Reductive cleaning after disperse printing
- Washing of burnt-out articles

The plant must satisfy the currently valid European Machinery Directive and must therefore meet the highest standards applicable anywhere in the world. In addition, there are a number of additional standards and safety regulations which need to be met: the Machinery Directive (9. GÜSGV), the Equipment and Product Safety Act (GPSG), the Industrial Health and Safety Ordinance (BetrSichV), as well as Directive 2006/42/EC of the European Parliament and the European Council dated 17.05.2006 on machinery, which is also an amendment of Directive 95/16/EC.

Key issues like "crease-free fabric guidance", "low-tension fabric transport", "no lateral drifting of the fabric" and "reproducible processes" all correspond to the current state of the art, and corresponding solutions are implemented in every Benninger plant.

The large number of different chemicals at the front end of the plant enables the customer to apply the optimum quantity of auxiliary materials at exactly the right point according to his portfolio. The special fabric guidance in the first compartment and the required low distance between the rollers counteract the potential risk of creasing. At the same time, the first two compartments with a fabric capacity significantly in excess of 60 m offer sufficient treatment time to allow even more challenging application processes to be successfully implemented.

The next step focuses on the process of washing. In order to achieve consistent washing results at varying production speeds (10–60 m/min), TurboFlush technology is employed at this stage. The exceptional washing performance - irrespective of the speed is one of the many key criteria of this washing machine developed by Küsters.

Thanks to the short distances between the guide rollers, the exceptional mechanical washing performance has no negative effects whatsoever on the fabric tension; efficient recirculation with more than 500 l of liquor per minute completes the performance characteristics of the exceptional high-performance washing machine.

In order to remove all chemicals from the fabric and render it pH-neutral and free of residues (as required in the specification), the two final compartments house the neutralisation stage with automatic pH-control and a final rinsing bath. As the products of Junkers & Müllers are predominantly synthetic products, vacuum suction systems are used both in the front section (for liquor separation) and before the final squeezer (for high-performance drainage).

Inductive dosing lines ensure that the auxiliary chemicals used are metered in milliliter accuracy. This pinpoint accuracy not only protects the environment, but is also beneficial in terms of the variable costs. In order to improve the efficiency with which water is used, the roller vats can be run also with a reduced liquor volume - in this case the required washing liquor is reduced by almost a half.

With the aid of a sufficiently high number of rotary sieve filters, insoluble contamination and lint is directly removed from the system. An intelligent particle guidance system also ensures that solid particles collect at a point from where they can be removed quickly and efficiently via spray pipes into the liquor discharge. As a result, extended periods of downtime while the machine is being cleaned can be avoided.

As well as the number of meters of fabric which have passed through, the "brain" of these components (with digital closed-loop drive control and process control) also measures the consumption of electric energy, water, steam, chemicals and compressed air. A centrally networked recipe database not only saves all of the machine and process parameters, but also the name of the machine operator, the weight of the woven fabric, the production time and all error logs. When it becomes necessary to upload a software update to the PLC, this can be done effortlessly via the Internet using the Telelink interface.

Junkers & Müllers have gained the following experiences with the new high-performance washing plant:

“Installation of the plant was completed in June 2009, allowing the commissioning process to start on-time before the end of June 2009. The aim of the project was to drastically reduce

consumption data and therefore also costs by introducing an intelligent control technology with integrated consumption data indication.

Since the new system was taken into operation, there have been no defects in terms of the required washing results, as a result of which it has been possible to completely eliminate the original defect quota of the old open width washing plant, which was primarily caused by the poor washing activity of the outdated washing compartments, which no longer represented the state of the art. In this case, the stated goal of reducing the defect quota by half was far exceeded.



During the commissioning process, numerous trial production runs were set up in conjunction with the chemical industry. Modifications were made to the recipes, which were optimised on the basis of the consumption documentation and the washing results, and as a result the targeted reduction of consumption data (fresh water, chemicals, energy) was also far exceeded. Thanks to the intelligent database structure which is integrated in the plant, it has now become possible to produce a wide range of very different products with varying fabric

weights - always using exactly the same quantities of water per kilo of fabric weight, with type-compliant and excellent washing results.

At the same time, a workplace environment was created in the implementation phase which is optimally designed in terms of safety and ergonomic aspects.”

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