Sustainability that pays off.

World Champion Technology:
Higher Energy Efficiency – Higher Profits

Production process from fibre to hydroentangled hygienic nonwovens: Energy requirement reduced by 27 per cent in 10 years

With their production lines for hydroentangled nonwovens the German mechanical engineering companies did credit to the demand for sustainability. Over a ten years period only, the companies adhering to VDMA have succeeded in saving 27 % of energy and in addition big quantities of water and fibre material for the overall production. For the process of spunlacing/hydroentangling itself, even 36 % and for drying of nonwovens 34 % of energy could be saved.

If the global production of almost one million tons of raw material was run exclusively on German latest world champion technology, an amount of energy of 555 billion watt hours (555 GWh) could be saved every year.

This is the amount of current, which an average coal power station with a gross power of 800 megawatt produces in the course of four months.

From fibre manufacture to dried nonwovens - German technology makes energy costs shrink. For a growing market of spunlaced nonwovens for hygienic articles this is the right answer: Sustainability that pays off. The forecasts for the coming years see an increase in production of these hydroentangled fabrics by 8.2 % per year. The biggest markets for the equipment which is also called spunlacing are North America, Europe and China.

Saving potentials at a glance

Spunlacing is gaining ground because – above all – it works without any chemical additives. Nonwoven fabrics, which have been hydroentangled, are particularly soft and at the same time tear-resistant as well as skin and environmental-friendly.

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Not to forget the efficiency increase made possible today by the German mechanical engineering companies. If the overall production of spunlaced nonwovens was made on the latest state-of-the-art German machinery, the following saving potentials could be reached year by year according to the VDMA sustainability initiative:

Electrical energy:
555 billion watt hours (555 GWh) – this corresponds to an annual consumption of nearly 160,000 central European households or the energy production of an average coal power station with a gross power of 800 megawatt during four months.

Water:
89,000 cubic meters – with this amount of water 445,000 bath tubs could be filled.

Fibre consumption:
665 tons – 2,200 fibre bales of 300 kg each would be saved every year. Piled up, the bales would form a tower of 2,500 m height – three times the highest building in the world, the Burj Khalifa in Dubai with 830 meters.

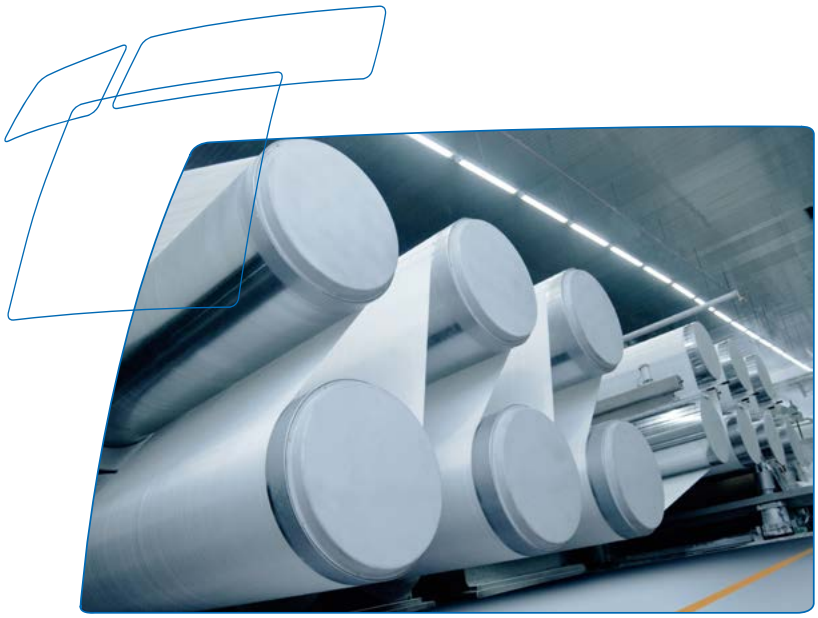
Hygienic nonwovens for a wide range of applications
Wipes and wet wipes made of nonwoven fabrics for the most various applications form the biggest individual market, and everyday life without them is hardly conceivable. This field comprises wipes for personal hygiene with a grammage between 15 and 80 g/m² and cleaning cloths for households and the industrial environment with several hundred g/m². Other applications are:

- cotton pads
- medical textiles (cloths, wound dressings, plaster base)
- carrier materials for coatings
- protective clothing
- filter media – in particular for filtration of hot gases

Basis of the sustainability calculations
The energy analysis has been carried out on the basis of a hygienic nonwovens with the following parameters:

- Grammage: 50 g/m²
- Composition: 50 % polyester / 50 % viscose
- PET staple fibres: 1,7 dtex, 38 mm (polyester cotton type)
- Viscose staple fibres: 1,7 dtex, 38 mm

Beside the electrical energy and the energy for exhaust and compressed air consumed (for all steps from polyester fibre production to drying of the nonwovens) also the thermal energy (direct gas, thermal oil, steam) necessary for the production of the fibre and for drying have been taken into account.



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The balance envelope from the fibre to the finished raw product includes the energy and the material turnovers within the following process steps:

1a. As a rule, production of polyester fibres (PET cotton type) is made in two process steps. Here, the process starting at the melt transfer is considered. After spinning in the first step, the fibre material in a second step passes machinery for drawing, curling, fixing and cutting before the fibres are formed to bales by a press.
1b. Production of the viscose staple fibre (not taken into consideration for calculation)
2. Fully-automatic opening and blending of the fibres
3. Two cards arranged downstream produce the fibrous web.
4. Spunlacing
5. Drying

German textile machinery with a guarantee to save energy

German technology is of leading quality worldwide; besides high productivity and energy efficiency it guarantees at the same time high technical availability of the equipment.

Why is German textile machinery so particularly eco-friendly and sustainable? Hundreds of engineers in design and development in the manufacturing companies give the answer: „It is, because today energy costs have a priority over the labour costs." For several years the German engineers have paid particular attention to optimizing the most energy-intensive process steps. In our example this is the drying, the manufacture of the polyester fibre and the spunlacing, which account for about 90 % of the overall energy consumption of a production line.

The results achieved for the product chosen here reflects the great awareness for energy and resources:

- With today's possibilities of the German textile machinery engineering compared to the machinery generation ten years ago, more than one quarter of energy (27 %) can be saved in the production of the raw product for the hygienic nonwovens specified before.
- Using innovative measures in the process water cycle of spunlacing, the water loss could be reduced by 10 %.
- Reducing fibre consumption by re-feeding exhausted fibres into the process for example, lowers the energy requirement by 345 MWh/year in addition.

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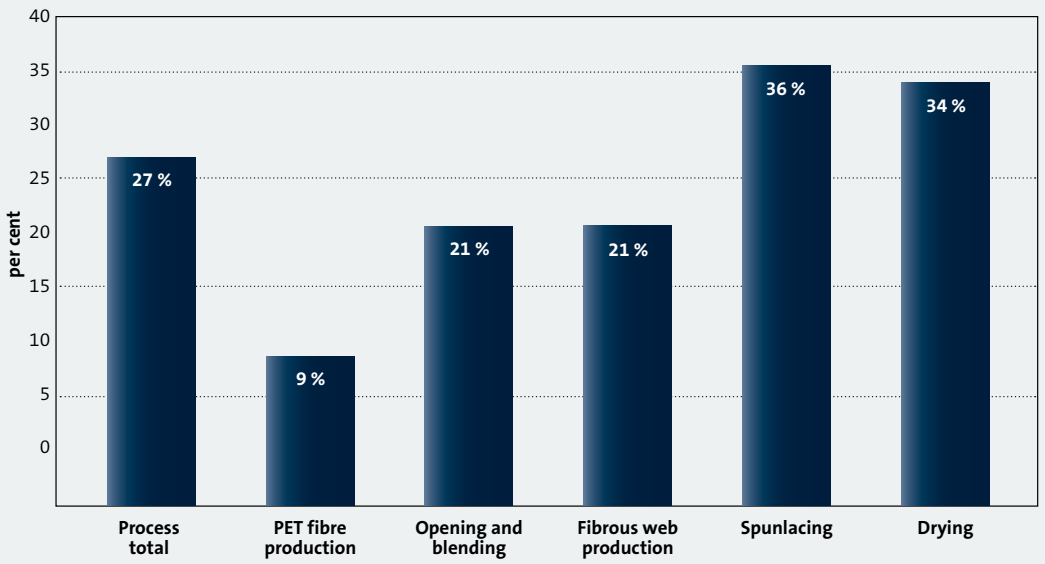
Hydroentangled hygienic nonwovens – energy saving 2003 – 2013 in %



Top rating for German technology

Roland Berger Strategy Consultants, one of the world's leading consultancies had awarded best ratings to the German textile technology for increase of energy efficiency. According to Roland Berger, further development of German textile technology should result in an about 15 % higher efficiency until 2020. This product-specific comparison along the overall process chain even proves that German technology reaches more already today.

Leverages to save energy in detail

How are these enormous savings possible even with the option of further reduced consumptions? Before considering the individual process steps, the fields of general energy saving should be mentioned. Here the focus is on energy recovery from drive technology, energy management systems as well as high-precision measuring and control technology to meet the production parameters. Saving effects can also be generated from an optimised management of product formulation and from superordinate process control systems.

Latest machinery generations of German technology show energy-optimised concepts for each of the five process steps studied:

1. PET fibre production: Modified process control, prevention of thermal losses, more efficient drive technology and adapted motor dimensioning.
2. Opening and blending of fibres: Optimised dimensioning of the equipment and high-efficient air conveyance through the individual components.
3. Production of the fibrous web: Adapted drive technology and increase of production output with constant energy use.

4. Spunlacing: A package of measures in the last ten years reduced the energy consumption in this process step by one third (exactly 36 %). Improvement of the hydroentangling process and optimisation of the jet strips and the shells of the spunlace drums have been the focal points. High-efficient exhaust units for the needling drums and optimised drainage on the exhaust belt contributed to these savings.
5. Drying: Optimised air conveyance, increased specific evaporation working with heat recovery, humidity control of the exhaust air and higher production speeds up to 400 m/min. resulted in energy savings of 34 % for the final technology step.

Conserving resources as additional advantage

If brand-new textile technology runs faster and needs less energy, a look at those factors like the quantity of raw material and water is worth-while. Here as well during the past ten years German technology serves with improvements as mentioned before. Which are the leverages in this field? The classical points of fibre loss have been minimised, for example and fibre re-feeding has been optimised.

The results are perfectly tuned fibre recycling concepts. The reduction of the losses in raw material and fibres (spinning, drawing, finishing, opening, blending and production of the fibrous web) of 30 % speaks for itself. It generates in addition a considerably reduced energy consumption of 345 MWh/year.

According to the experts' calculations also a volume of water worth mentioning has been saved. The water consumption reduced by 10 %, in particular for the spunlacing process has been achieved by a high-efficient drainage on the exhaust belt with adapted suction zones. In addition, this water cycle is equipped with a high-efficient filtration, needing only a minimum of fresh water to be added.

Facts & Figures:

- high-efficient design of the process steps and
- energy-optimised process control and design of the machines
- 27 % less electrical energy
- 10 % less process water
- reduced fibre losses

Companies participating

www.machines-for-textiles.com/blue-competence/stories

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