HAVER & BOECKER

DIE DRAHTWEBER

WHEN TINY MESHES MASTER MIGHTY TASKS.

THREE PRACTICAL EXAMPLES SHOW HOW WOVEN WIRE CLOTH FILTERS SET STANDARDS IN MEDICAL TECHNOLOGY.

CONTENT

STRINGENT REQUIREMENTS:
WHAT FILTER COMPONENTS MUST ACHIEVE. 3

VERSATILE, ROBUST AND PRECISE:
THE ADVANTAGES OF WOVEN WIRE CLOTH. 4

PRACTICAL APPLICATIONS: 5
EXAMPLE POWDER INHALERS 5
EXAMPLE BLOOD FILTERS 6
EXAMPLE RESPIRATORS 7

UNLIMITED POSSIBILITIES:
AN OUTLOOK ON POTENTIAL AREAS OF APPLICATION. 9

AN EXEMPLARY PARTNERSHIP:
THE HALLMARKS OF A GOOD COMPONENT MANUFACTURER. 10

ABOUT HAVER & BOECKER. 13

STRINGENT REQUIREMENTS: WHAT FILTER COMPONENTS MUST ACHIEVE.

In hardly any other area of industrial development are the demands placed on products as high as those placed on medical technology. This is not surprising considering that human lifes depend on the performance and reliable quality of medical equipment. Manufacturers of medical equipment thus bear a high level of responsibility: production errors or even failures are particularly serious if they endanger the health of patients or medical staff.

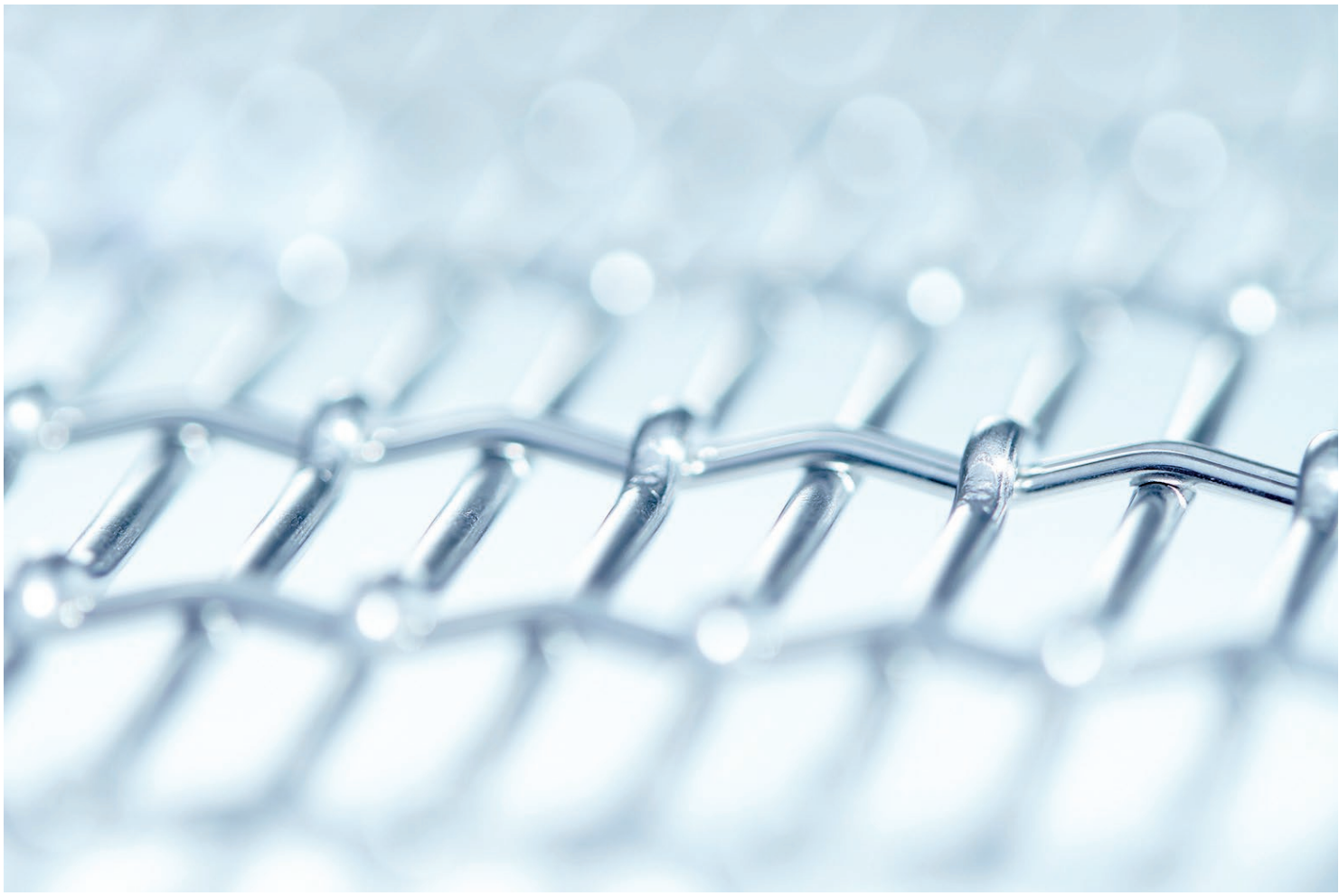
What applies to complex equipment also applies to individual components such as filter elements, which are found in numerous medical technology products where absolute safety and reliability are the most important benchmarks for high quality. Filter media are primarily made of woven wire cloth, plastic, textile or paper.

Unlike the latter three, filters made of woven wire cloth are much more robust and therefore more durable. At the same time, woven wire cloth also brings with it special challenges such as higher cost of investment and ensuring that the mesh is grease-free and without loose wires. These challenges can be successfully met by implementing the right innovative manufacturing processes whilst exercising greatest possible diligence in the development, production and testing of woven wire cloth filters. This results in modern woven wire cloth filters that are precisely tailored to the high demands of medical technology and are often one step ahead of other materials as regards efficiency and reliability.

VERSATILE, ROBUST AND PRECISE: THE ADVANTAGES OF WOVEN WIRE CLOTH.

Today, filters made of woven wire cloth for the field of medical technology are used in safety-critical components such as powder inhalers, blood filters and respirators. The variety of applications underscores the central advantage of wire cloth: its outstanding versatility.

Woven wire cloth filters come into play whenever it's a matter of filtering out impurities, evenly distributing active ingredients or separating solid, liquid and gaseous media. This is due to the wide range of designs, selection of materials and wire thicknesses that offer medical technology engineers and developers opportunities, which are not available to them when they work with plastics, textiles or paper. This makes is possible to precisely define pore sizes and thus the flow characteristics of woven wire cloth filters. At the same time, woven wire cloth has a much higher inherent stability than filter mesh made from alternative materials. This stability is an important quality factor, in particular when filter media are exposed to physical loads when they are used under pressure for example. Only woven wire cloth combines a high level of robustness with the permeability and flexibility also offered by filter cloth.



PRACTICAL APPLICATIONS:

The following applications are examples of how filters made of woven wire cloth ensure reliable filtration results and complete safety - and thus set the standard in medical technology.

EXAMPLE POWDER INHALERS

The product and its function

The inhaler sieve is a rolled-edged sieve made of woven wire cloth, which is inserted in the mouthpiece of the powder inhaler. To prepare for inhalation, the mouthpiece is opened and the capsule is inserted vertically into the chamber. When inserted, the specially shaped inhaler sieve ensures that the capsule is correctly positioned to make it expand in the chamber. The sieve holds the capsule shell in place while the patient is inhaling. The fine and uniform structure of the woven wire cloth ensures that the medication is evenly distributed.

Special challenges

Even before the inhaler sieve is used in practice, it must fulfil important requirements as regards process capability: the metal mesh must be separable so that it is suitable for automatic further processing. Rolled-edge sieves meet this performance profile in particular thanks to their compressed edge, which prevents the components from getting stuck. The rolled edge also makes sure that the edge wires are held firmly in place to ensure optimal patient safety. The mesh does not have to be subjected to cost-intensive thermal treatment for this purpose. In this way, all quality criteria are met also from an economic point of view.

Complex cleaning procedures, which are integrated at several points in the production process effectively and completely remove any loose wires. Several visual inspections and wipe tests in combination with a detailed camera inspection additionally ensure that there are no wire residues remaining on the filter.

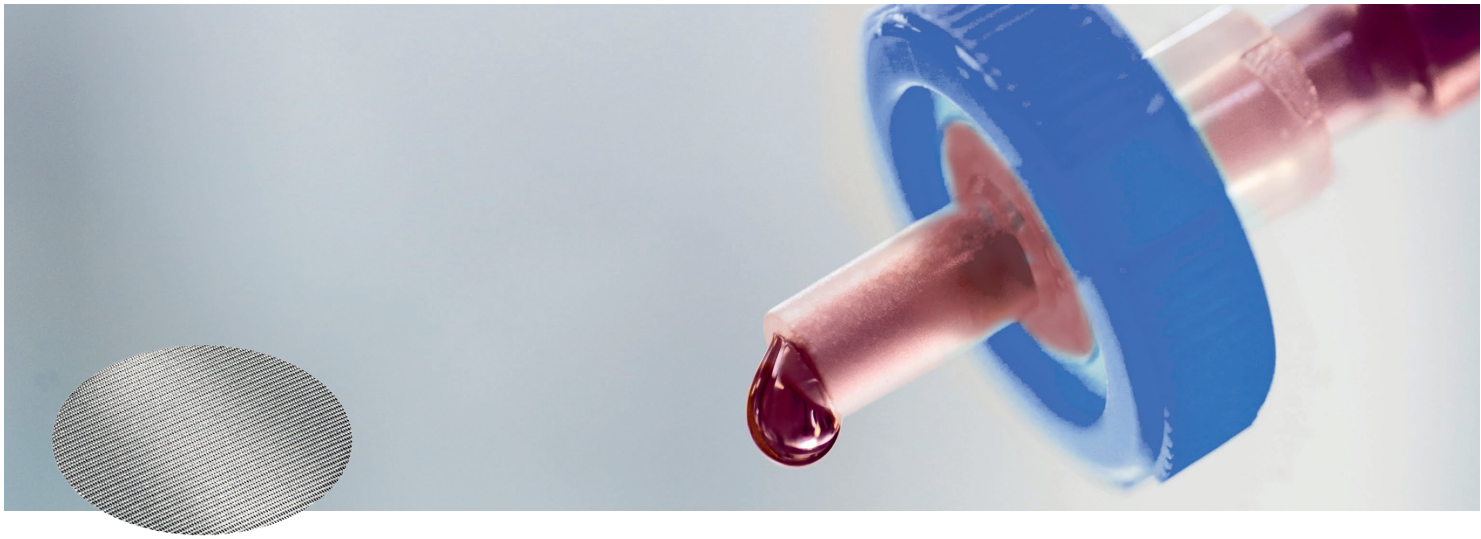
The HAVER EML 200 test sieve shaker removes any loose wires. Complex manufacturing processes of this kind require careful planning, professional scheduling and optimised production steps. These factors form the basis for a reliable supply guarantee, which must be ensured at all times in a medical environment. After all, it is essential to be able to react reliably, quickly and flexibly at short notice to order peaks and local or global outbreaks of disease.

The HAVER EML 200 test sieve shaker removes any loose wires.

EXAMPLE BLOOD FILTERS

The product and its function

Filtration is the central component of blood transfusions or transfusion of individual components such as blood plasma. What are known as micro-aggregates can form when blood reserves are stored, which can lead to serious health problems if they enter the bloodstream of the recipient. This is precisely what blood filters prevent: with a precisely defined pore size of 18 microns, these filters retain micro-aggregates while allowing all viable solid blood components to pass through intact. Blood filters significantly reduce the risk of lung or blood vessel damage during blood transfusions particularly in the fields of neonatology and paediatrics.



Special challenges

Avoiding cytolysis (cell destruction) has top priority when filtering blood. For this reason, the biocompatibility of the filter media plays a central role: a filter mesh must minimise the damage to membranes of the viable blood components to the greatest possible extent so that the blood cells remain intact after passing through the filter medium. In this conjunction, the great advantage of woven wire cloth filters is that they cause less cytolysis than comparable plastic filters. Thanks to their antistatic properties, which allow a high flow of viable blood components, they are also especially suitable for filtering out fine micro-organisms contained in the blood.

Guaranteeing consistent pore sizes is yet another important quality criterion for use in blood filters. Woven wire cloth is particularly suitable in this respect, as all wire intersections can be reliably fixed in place. They are thermally treated during production for this purpose. This prevents wires from becoming loose and thus ensures the absolute safety of patients. A bubble point test verifies that the finished mesh actually has the pre-defined maximum pore size.

As with all products used in the field of medical technology, cleanliness also plays a central role in the production process of filter plates for blood filters. Accordingly, the manufacturing process is characterised by extensive quality inspections and thorough cleaning procedures such as ultrasound-assisted aqueous cleaning. Ultrasound removes all particles from the wire surface or in the mesh to thus achieve the required level of cleanliness.

Bubble Point Test

The upper side of a mesh is wetted with a liquid after which pressure is applied to the underside of the mesh until bubbles form on the upper side. The maximum pore size of the mesh can be derived based on the applied pressure with the help of a formula.

EXAMPLE RESPIRATORS

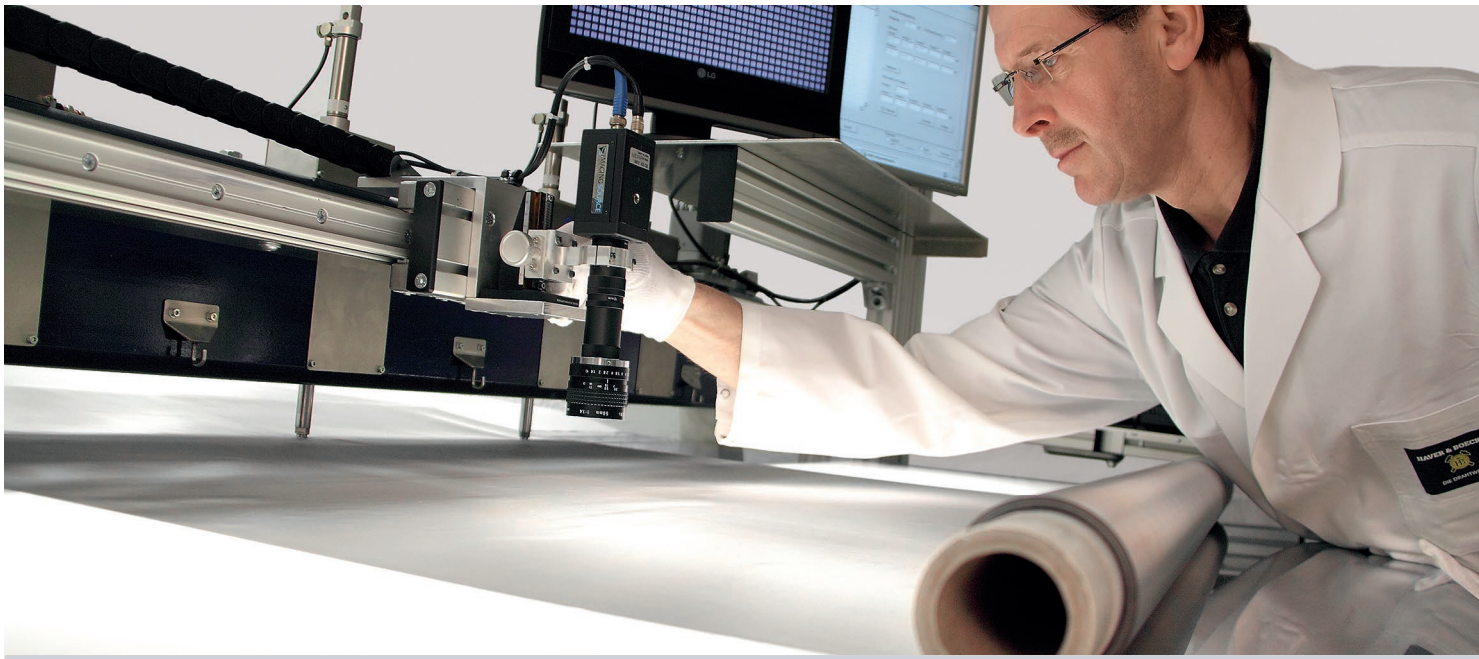
The product and its function

Intensive care units are an integral part of health care and represent another area of application for woven wire cloth filters. In the form of discs and blanks, they are central components in the manufacture of respirators. By retaining respirable particles, the filter mesh ensures the best possible quality and purity of the air supplied. The required pore size and stability requirements determine whether single or multi-layer woven wire cloth is the best solution. For both variants, there are comparable challenges during production.

Special challenges

Metal woven wire cloth for use in medical applications must be free of grease in accordance with the requirements of DIN EN ISO 15001. An important aspect considering that grease residues could cause foreign particles to cling to the mesh. To ensure that the mesh blanks receive approval for use in medical equipment, they are sintered during production, i.e. heated to more than 1000°C to remove all grease residues. A comparable effect is achieved by a vapour condensation cleaning system, which is integrated into the production process for single-layer filter mesh for respirators.

As with the examples described above, the precision of the mesh and the elimination of loose wires must also be ensured for the mesh blanks in the respirator. For this reason, the cut mesh strips are inspected for weaving errors after which the edges are punched and compacted.



Checking for weaving faults is a central aspect of quality management.

The previously degreased and thoroughly cleaned mesh often still has a long way to go before it is finally installed in the respirator. The risk of contamination must be ruled out to the greatest possible extent throughout the entire transport process. Correctly packing woven wire cloth and fabricated woven wire cloth parts therefore plays an extremely important role. Antistatic film bags offer effective protection against moisture and dust particles.

UNLIMITED POSSIBILITIES: AN OUTLOOK ON POTENTIAL AREAS OF APLLICATION.

These three practical examples illustrate only a small selection of the potential areas of application of metal woven wire cloth filters. The large field of medical technology offers many other possibilities. Woven wire cloth already plays a decisive role in the optimisation of complex products - such as in aesthetic surgery as filter elements in liposuction equipment or as components for implants.

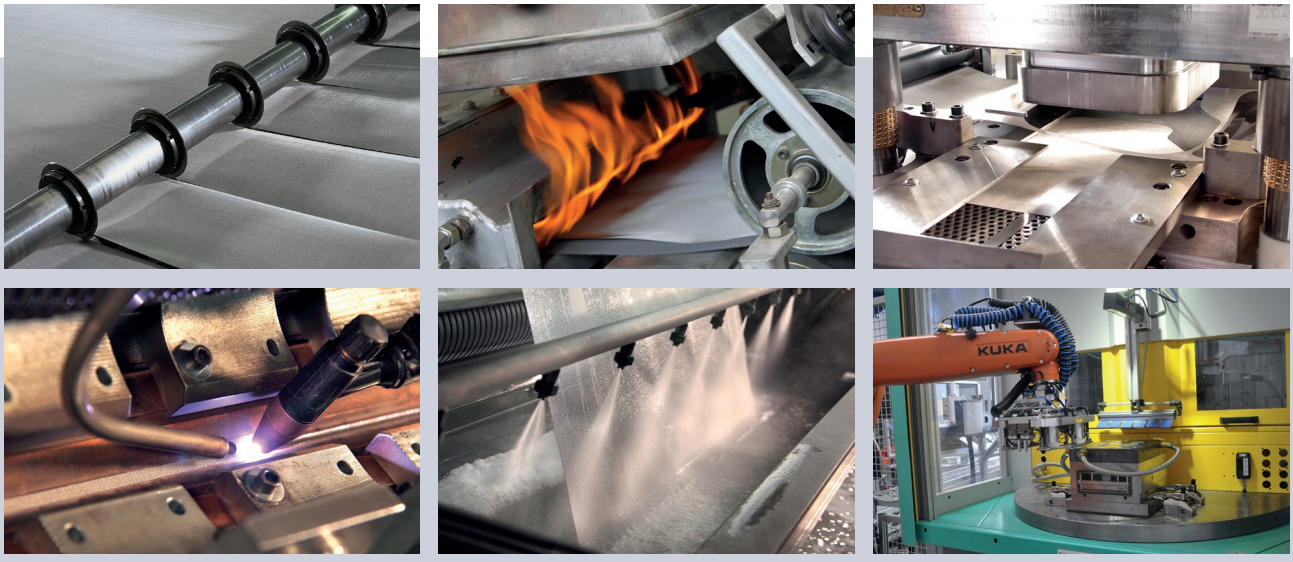
This variability is the result of the immense versatility of woven wire cloth, which goes far beyond shape and function. The material can also be selected individually: using stainless steel or titanium guarantees compliance with typical industrial requirements such as biocompatibility and absolute corrosion resistance. There are virtually no limits to the possibilities of optimising existing and developing new mesh specifications. With the help of complex simulation software, it is now possible to precisely determine the flow behaviour of a newly developed mesh and to adapt it exactly to specific requirements.

AN EXEMPLARY PARTNERSHIP: THE HALLMARKS OF A GOOD COMPONENT MANUFACTURER.

In the development of new, sophisticated solutions, engineers in the field of medical technology are faced with the challenge of the increased complexity involved in planning and designing individual components. As a result, suppliers are being tasked more and more with the development, production and continuous improvement of components. This increases the responsibility of the supplier who must put the well-being of the patient first throughout the entire process of developing and manufacturing medical products. It is thus all the more important to rely on experienced, competent and reliable partners when selecting component manufacturers and suppliers of individual parts.
Haver & Boecker is your competent partner in the field of woven wire cloth production.

ALL FROM ONE SOURCE.

Backed by decades of experience in the production and further processing of metal woven wire cloth, our engineers know what is important when it comes to manufacturing components for medical applications. Haver & Boecker combines a particularly high in-house production depth under one roof: from weaving individual wires, punching, embossing and plastic injection moulding of woven mesh parts, as well as welding complex filter elements, up to and including process-reliable packing of finished components. The entire development and production remains in the same hands and can thus be optimally coordinated. High production and storage capacities for a large number of mesh types additionally ensure a continuous supply for the further process chain.



Production facilities at Haver & Boecker include:
Cutting · Heat treatment · Stamping and forming · Welding · Cleaning · Plastic injection moulding.

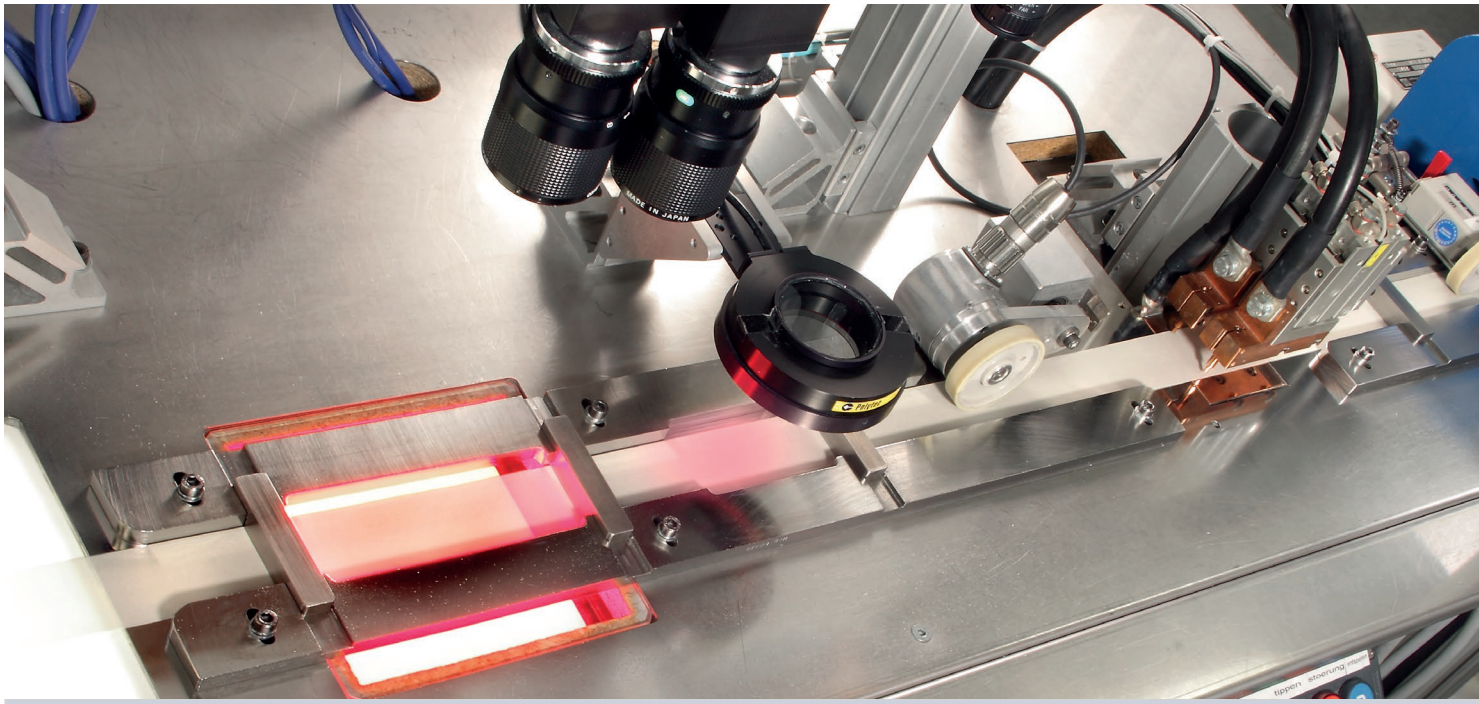
ALL IN THE INTEREST OF YOUR SAFETY.

MADE IN GERMANY

In light of potential local or regional outbreaks of disease, the reliability of supply is an extremely important aspect in the medical sector. For this reason, Haver & Boecker's wire weaving division operates for the most part independently of international supply chains. The predominantly regional procurement of primary materials and local processing of wire up to and including dispatch of the finished components are embedded in a customer-specific concept for securing supplies, which also provides for other options such as alternative production sites and tools. All of these measures are the basis for providing very reliable statements on delivery times and avoiding production downtimes due to supply bottlenecks.

EVERYTHING UNDER CONTROL.

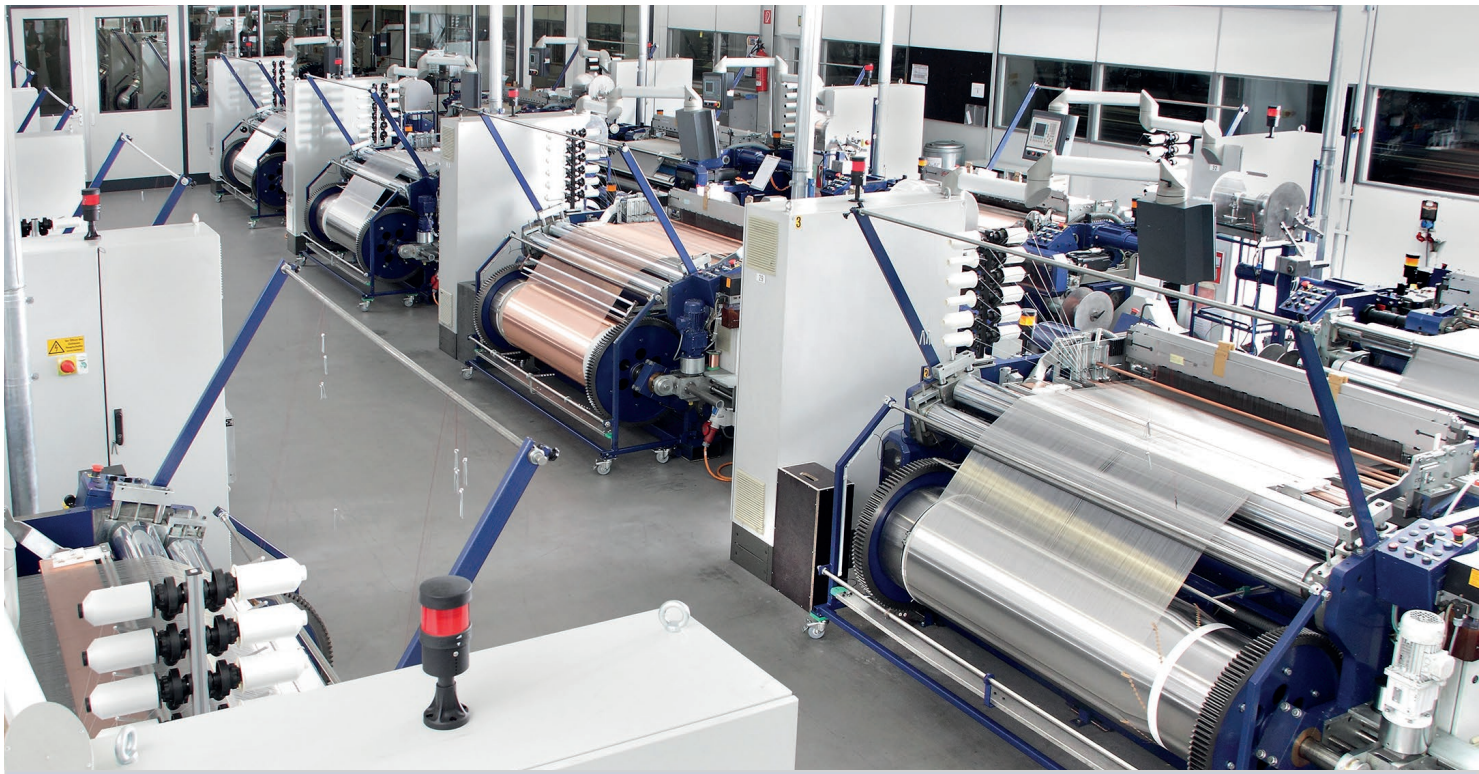
Thorough and comprehensive quality management coupled with precise cleaning procedures and quality inspections in every step of production are a matter of course at Haver & Boecker. Clean rooms are available for parts of the process chain according to the particular requirements in order to meet the highest in medical and hygienic demands. Comprehensive controls and documentation accompany the whole production process. We offer facilities for 100% camera inspection with our specially developed HAVER Vision System. This system is used to visually inspect and monitor products manufactured in large lots and is continuously being further developed to meet growing quality requirements. With the help of manual in-line inspections, Haver & Boecker pursues a zero-error strategy within a quality management system, which has been certified in accordance with DIN EN ISO 9001.



Everything in view: The "HAVER Vision System" utilises visual inspection and monitoring to meet the high quality requirements of finished mesh products.

ANYTHING IS POSSIBLE.

In addition to maximum precision and diligence, Haver & Boecker's activities throughout all areas of woven wire cloth production are characterised by an extraordinary innovative spirit. Our weaving machines and tools are designed and manufactured in our own factory in Germany so that adjustments for process optimisation can be implemented flexibly and at short notice. These weaving machines produce newly developed types of mesh, which are subsequently processed further and turned into innovative filters and fabricated parts. In the search for new challenges and clever solutions, Haver & Boecker relies on the experience of its employees and the use of modern technologies and intelligent software.



A special competence of Haver & Boecker is to design and manufacture woven wire cloth with weaving looms developed in-house.

ABOUT HAVER & BOECKER.

Haver & Boecker began producing wire cloth in Hohenlimburg, Germany in 1887. Today, the company is a worldwide leading manufacturer of woven woven wire cloth for industry, engineering, and architecture and design.

Haver & Boecker has been a pioneer in the technology of wire weaving for more than 130 years. The company develops and processes woven wire cloth into filters and fabricated components fulfilling the highest standards.

Whether it's aerospace and aviation, automotive, electrical engineering, medicine, chemicals, water filtration, mechanical engineering or plastics processing – customized solutions from Haver & Boecker offer the basis for efficient production processes, reliable function, optimum quality and distinctive design.

The preconditions for this are created based on the wide range of previously tried and tested products and the competence to develop new solutions for special applications.

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