GKD: hybrid mesh as an ideal solution

Greater process efficiency through tailor-made structures

Whether the objective is to enhance the performance of components, reduce costs or counteract the limited availability of raw materials, reliable alternatives are much sought-after in many industrial applications. As the world's leading expert for application-specific, high-performance mesh, GKD – Gebr. Kufferath AG (GKD) provides pioneering solutions for plant engineering and the manufacturing industry with its custom-designed hybrid structures.

Thanks to the application-specific combination of different materials in one structure, hybrid meshes enable decisive process improvements to be made. By intelligently combining the physical properties of the materials used, GKD develops completely new kinds of mesh structures that realize optimization potential for individual customers with their customized performance spectrum and previously unknown product properties. Alongside all metals and polymers, GKD also weaves materials such as aramid, ceramic, glass, natural products or textile fibers. The technology leader aims to use all industrially weaveable materials for such hybrid combinations depending on each individual case. GKD weaves monofilaments, multifilaments or wires made of these materials into single-, multi-ply – and if required even multidimensional – mesh structures. These significantly expand the possible range of deployments and performance of conventional solutions, thereby permanently improving process efficiency.

Hybridization offers two possible applications for nonconductive basic mesh designs. As such, a matrix of conductive materials can be integrated to act as Faraday components in order to provide shielding from electromagnetic

radiation. Electrostatic charging is avoided or dissipated using specific material combinations. This not only prevents the process-based risk of fire or explosion: in fluid and gas filtration these hybrid meshes also prevent electric fields from forming that negatively impact flow mechanisms or filtration rates. GKD hybrid meshes also offer decisive added value in wear-intensive bulk-volume applications such as filtering process fluids. Here, perfectly tailored metal-plastic combinations can significantly save costs while at the same time markedly extending service lives. Moreover, an increased plastic content also reduces weight. For heavily loaded surfaces, for example the corners of filter leaves, GKD improves resistance through the partial use of hybrid mesh. To this end, the owner-run SME weaves warp or weft sections in metal instead of in plastic. Solutions that combine a certain number of plastic wires with metal wires at defined intervals in the weft direction have proven effective in practice. The company achieves an even better targeting of multifunctionality through the use of different materials in multi-ply meshes. Here, properties are added at the exact points in the mesh at which they are required. In highly corrosive processes, hybrid meshes offer interesting alternatives to structures made up of expensive raw materials with only limited availability such as Hastelloy or titanium. GKD combines a basic metal structure with a polymer material such as PTFE in a YMAX weave, which – unlike a pure metal structure – also achieves finer filtration rates more reliably. Another positive effect is that material costs are lowered by around 50 percent. Compatibility with flexing cycles to fit the process in question, mechanical strength, temperature resistance or surface properties individually adapted in line with adhesion properties or cleaning behavior are further typical examples of the process advantages offered by hybrid meshes. Furthermore, the plastic or elastic forming properties can be altered in certain directions by selecting specific materials and changing the diameter of the metallic cross section. This makes hybrid mesh ideal as a high-performance shatter and fracture protection solution. The possibility to

integrate desired materials into flat structures as meshes when shaping them is still relatively unknown. Because the material does not change during the weaving process, such hybrid meshes are the ideal solution in particular when the customer requires a specific material for their application. The resulting mesh is not only breathable, permeable, even and oriented – it can also be subjected to downstream processing stages without any problem. Hybrid meshes also enjoy groundbreaking success when it comes to substituting complex coating. Through hybridization, the mesh is given the required properties in a controlled and reproducible way. Limited dimensions are therefore a thing of the past, as are the considerably higher costs associated with a coating procedure.

Up to ten material components in a single mesh

Despite the numerous proven advantages of hybrid meshes, this type of product is often not even considered by users. One reason for this is probably a general lack of knowledge of weaving technologies and their fields of application. As a result, the option of hybridization is unknown – and therefore also the unique solutions of GKD. The success of all GKD meshes is based on their application-specific development. As such, the virtually limitless range of materials that can be integrated in hybrid meshes greatly expands the range of solutions offered by conventional metal or synthetic mesh. For GKD, the only factors limiting the combination of materials are the customer's specific application conditions. Thanks to a highly specialized network of suppliers built up over the course of many years, GKD also obtains materials such as ceramic in weaveable form. This is used to create custom-developed hybrid mesh using high-end weaving technology. A loom that can mix up to ten material components in a single mesh plays a key role here. The machine combines up to four – or where necessary eight – different materials in the weft direction, either as wires, cables or fibers. Two further materials can then be processed in the warp direction during the

weaving process. Furthermore, the number of heald shafts and the corresponding control technology open up virtually unlimited possibilities in weaving technology to GKD.

Everything from a single source

When GKD is tasked with solving a customer's problem, the initial question is always whether the task can be solved using mesh and which application-specific conditions are to be taken into account. The feasibility of the solutions proposed by the Development department is tested by technicians with regard to material selection, weave type, mesh width and machine availability. GKD answers weave- and design-related questions using simulations. For this purpose the GKD experts use a model created in the integrated simulation environment GeoDict to calculate properties such as strength, permeability or thermal conductivity. If the developed solution meets the customer's technical and economical expectations, the first test weaves are performed. The amount of time required for the realization of the finished solution depends on the warp type, the material properties and machine availability. While the preparation of a second warp can take up to six weeks, it is possible to weave up to three different samples in a single day if only the weft material is changed and the corresponding loom is available. Thanks to this end-to-end weaving expertise and an integrated production environment, a custom-developed hybrid mesh is theoretically ready for series production within just a few months – on the condition that the customer also validates the series maturity at a correspondingly early stage. As such, hybrid meshes from GKD offer a variety of interesting options for improving the efficiency, reliability and cost-effectiveness of processes and products.

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GKD – WORLD WIDE WEAVE

The owner-run technical weaver GKD – Gebr. Kufferath AG is the global market leader for metal and plastic woven solutions as well as spiral fabrics. Four independent business divisions bundle their expertise under one roof: Industrial Mesh (woven metal mesh and filter solutions), Process Belts (belts made of mesh and spirals), Metalfabrics (façades, safety and interior design made of metal fabrics) and Mediamesh® (transparent media façades). With its headquarter in Germany and five other facilities in the US, South Africa, China, India and Chile – as well as its branches in France, Great Britain, Spain, Dubai, Qatar and worldwide representatives, GKD is close to markets anywhere in the world.

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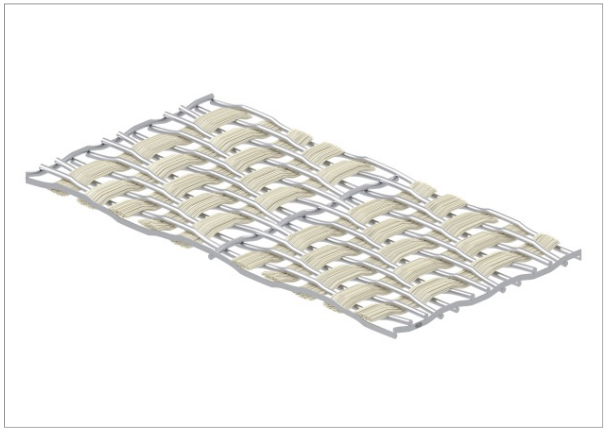
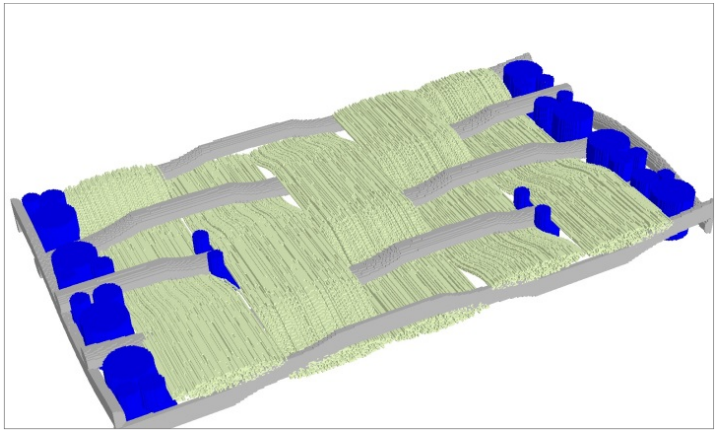
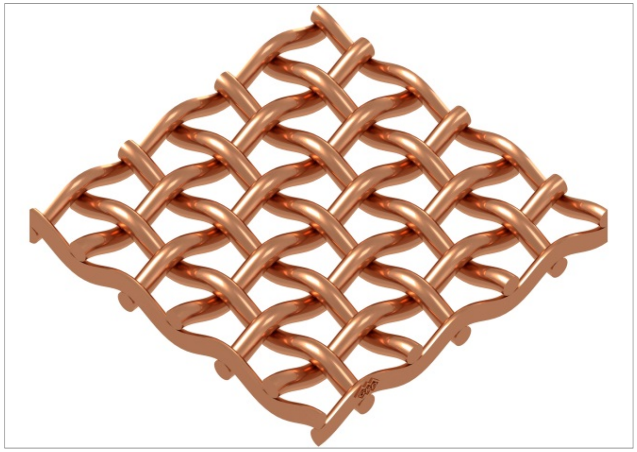


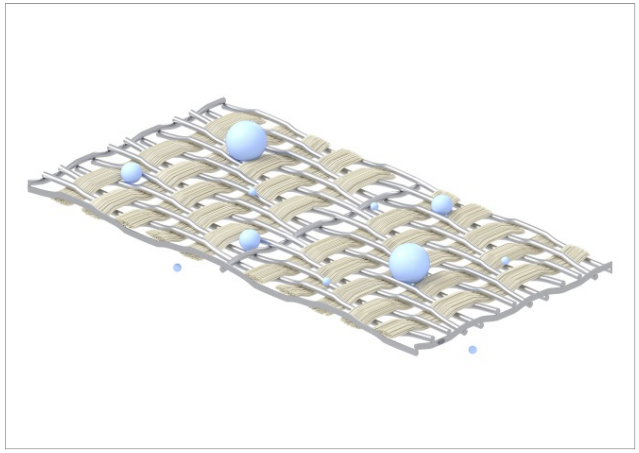
Picture 1: Thanks to the application-specific combination of different materials in one structure, hybrid meshes from GKD enable decisive process improvements to be made.



Picture 2: GKD weaves monofilaments, multifilaments or wires into single-, multi-ply – and if required even multidimensional – mesh structures.



Picture 3: Hybrid structures from GKD are also used in shielding meshes for protection against electromagnetic radiation.



Picture 4: Alongside all metals and polymers, GKD also weaves materials such as aramid, ceramic, glass, natural products or textile fibers in hybrid structures.

Picture 1-4 © GKD

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