



WORLD WIDE WEAVE

High-tech and iconography

From metal mesh to a noble sword

At just 36 he won the international architecture competition to design the *Bibliothèque Nationale de France* (BnF) and is now set to take his place among the immortals at the age of 63. At a special ceremony held in Paris, French architect and city planner Dominique Perrault took his place among the eight lifetime members of the *Académie des Beaux-Arts* in the field of architecture. Prince Karim Aga Khan IV held the laudatory speech for the man who discovered metallic mesh for the field of architecture – a key style element of Perrault's buildings for more than 20 years. The valuable sword, which is one of the honorable office's insignias, was not produced elaborately by a goldsmith. Instead, Perrault requested that it be made from stainless steel with a reinforcing steel look. GKD – GEBR. KUFFERATH AG (GKD), the company that has been implementing his architectural visions in metallic mesh since the BnF, also proved a congenial partner in mastering this rather unusual challenge. Together with the Aachen University of Applied Sciences, the company developed the solution for high-tech production of the puristic sword using selective laser melting.

The *Institut de France* is the umbrella organization of the five state academies, which include the *Académie Française* and the *Académie des Beaux-Arts*. For their services, the members are elected for life as guardians of the arts, humanities or natural sciences and are held in the highest esteem in France. The number of seats is strictly limited, so a new member may only join following the death of a former member. In Dominique Perrault, a new member has now been elected to the group of eight *immortals* in the field of



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architecture. Other members include Sir Norman Foster, Aymeric Zublena and Jean-Michel Wilmotte. Perrault's discovery of GKD metal mesh for architecture also inspired all of these to launch their own projects with this material. The *Académie des Beaux-Arts* honored Perrault's exceptional architecture for France with the ceremony held under the famous dome of the former chapel in the *Collège des Quatre Nations*. He has created several of the most emblematic buildings in the whole of France with the *Bibliothèque Nationale de France*, the *Grand Théâtre d'Albi*, the towers known as the *City Lights* in Pont de Sèvres, as well as the *Pavillon Dufour* in Versailles. He continues to express his vision of "architecture that disappears" that he has been refining since the BnF with new interpretations of façades made of GKD metallic mesh. Alongside the *European Court of Justice* in Luxembourg or the *Velodrome* in Berlin, excellent examples of this can be found at the *Olympic Tennis Center*, the *Pasarela del Arganzuela* footbridge in Madrid and the *Ecole Polytechnique Fédérale de Lausanne (EPFL)* university. Perrault's buildings gain their specific identity through elegance and simplicity. The key motivation here is always what the architecture can do for its surroundings, so his projects regularly cross the boundaries of conventional buildings in order to benefit their environment. Whether towers reaching far into the sky or large-scale subterranean constructions, Perrault's ideas are driven by strategies for transforming public space. He uses metal mesh puristically, mystically or playfully to create buildings without visible walls and thereby creates flowing transitions between indoors and outdoors, architecture and the surrounding landscape, function and emotion. The shapes he creates redefine their context without dominating it. When he discovered GKD more than 20 years ago, Perrault found a courageous industrial partner that shared his vision and had both the expertise and the leading technology required to create metal mesh constructions capable of transforming entire locations.



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Transformation of technological expertise

It was therefore only logical that Perrault turned to GKD, his longstanding partner, to produce his sword for the *Académie des Beaux-Arts*. The model, developed by interior designer Gaëlle Lauriot-Prévost, fulfilled his wish for a sword that shows off its industrial origins. Outer ribs lend the meter-long, tapered stainless steel piece the appearance of reinforcing steel. Positioned close together, they form the stylized body. Combined with the extremely thin tip, the sword is reminiscent of an oversized drill bit or awl. The length and complexity of the cone shape that tapers from 35 mm to 5 mm in diameter made the search for a suitable production process a real challenge. Since Perrault had requested a sword made of stainless steel or aluminum, conventional casting processes were out of the question. The complex adornments also meant that neither cast aluminum nor turned stainless steel would work. As such, GKD took the decision to use the selective laser melting technology at the Aachen University of Applied Sciences. This process is typically used for complex tool and mold making in the aerospace or automotive industries. It can create virtually any shape – although only within limited, system-specific dimensions. This meant that the sword had to be divided into five elements and then reconnected with a threaded rod that was slid down the center. To assemble these parts accurately as per Perrault's CAD design, a bed of stainless steel powder with 45 µm grain size was scanned by laser and the components then selectively melted onto a grid-like support frame. This allowed wafer-thin layers to be applied in lines with melting tracks of just 0.1 mm. The process ran 24 hours a day for a total of four days. To be able to precisely connect the tracks with pins, the roughness caused by the production process first had to be ground to the tightest tolerances on the contact surfaces. The seams were then welded using a handheld laser and subsequently sandblasted so that they would



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match the porous structure of the other surfaces. Only the 17 mm long tip was polished to a shine to emphasize the tool-like character of the sword, as desired by Perrault. An engraving plate on the handle rounded off the piece after a full month of challenging work, and Perrault's vision of meeting the strict stipulations of the *Académie des Beaux-Arts* for the sword of an *immortal* "through symbiosis of classic iconography and high-tech" was complete. Perrault interpreted the process of selective laser welding that was used in its production as an analogy to the circle of life: light generates a solid object from dust that then turns back to dust when its days are over.

Catherine Pégard, President of Versailles Museum, presented Perrault with his sword during the ceremony held in Paris for his inclusion in the illustrious group of academy members. Just like all members' swords, it is stored securely in the *Institut de France* and only worn by Perrault as part of his full regalia during special meetings. GKD therefore had a counterpart made for him, which now hangs proudly in the French architect's office. After all, with its simple elegance and reinterpretation of industrial processes, it is the perfect representation of Perrault's architectural philosophy.

7.164 characters incl. spaces

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



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

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Picture 1: Dominique Perrault received the sword in a special ceremony on the occasion of his inclusion as a member of the Académie des Beaux-Arts in Paris.



Picture 2: Dominique Perrault applied metal mesh from GKD for the first time in the *Bibliothèque Nationale de France* in 12 different applications – here as a ceiling cladding.



Picture 3: A passable roof cladding made of metal mesh from GKD clads the upper third of the *Velodrom* in Berlin by Dominique Perrault.

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Picture 4: Golden metal mesh from GKD gives the *European Court of Justice* in Luxembourg its unmistakable appearance.



Picture 5: An elegant ceiling cladding made of GKD metal mesh floats above the seating in the Principal Courtroom of the *European Court of Justice* in Luxembourg.



Picture 6: The appearance of the olympic tennis centre *Caja Magica* is characterized through its semitransparent metal mesh façade from GKD.



Picture 7: Stainless steel mesh type *Escale* from GKD surrounds the bridge *Pasarela del Arganzuela* in Madrid in full length, creating a shimmering helix.



Picture 8: The three-dimensional façade of the *Grand Théâtre des Cordeliers* of gold-coloured anodised aluminium mesh from GKD.

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Picture 9: The *Pôle de bio-ingénierie* of the *Ecole Polytechnique Fédérale de Lausanne (EPFL)* owes its unique appearance to a three-dimensional zig-zag façade consisting of 630 horizontally sliding solar protection elements made of metallic fabric from GKD.



Picture 10: To structure the foyer of the renamed *CityLights* at the Pont de Sèvres in Paris, ceiling-high room dividers made of Escale stainless steel mesh from GKD – GEBR. KUFFERATH AG were chosen.



Picture 11: For the ceiling design of the *Pavillon Dufour* at Castle Versailles, Dominique Perrault chose aluminum mesh from GKD type Escale 5 x 1.

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- Picture 7 © GKD/ARTEUNO WELT SL.
- Picture 8 © GKD/Vincent Boutin
- Picture 12,13 © FH Aachen



Picture 12: Perrault requested that the valuable sword, which is one of the honorable office's insignias, is made from stainless steel with a reinforcing steel look.



Picture 13: Together with the Aachen University of Applied Sciences, GKD developed the solution for the high-tech production of the sword for Dominique Perrault using selective laser melting.

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