

## Stainless Steel for Lightweight Architecture

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Thank you for giving me the chance to talk to you today about stainless steel as a building material. I will be illustrating my remarks by presenting a project – a factory – that we have worked on near the town of Nantes and suggesting a variation in the way that stainless steel can be used. First, though, because you will be visiting the Grande Bibliothèque tomorrow, I would just like to say a few words about how we used metal mesh in that building.

We really began to use metal mesh for the first time 10 years ago when the Grande Bibliothèque was built. Our research was focused on the specific need of having false ceilings. We were looking for a woven material with specific structural qualities that could be drawn and shaped, a material that was flexible and “alive”. We ran a few tests using woven glass fibre materials, but to obtain the necessary stiffness we had to include a layer of Gelcoat in the weave: unfortunately, Gelcoat is not non-flammable. At the same time, we tried a number of metal weaving techniques, thinking that it would be easy because of the many woven metal factories. However, it proved much harder than we had imagined and it took nearly three years to find factories capable of manufacturing materials with all the qualities we were looking for. We had to discuss our requirements at length and work closely



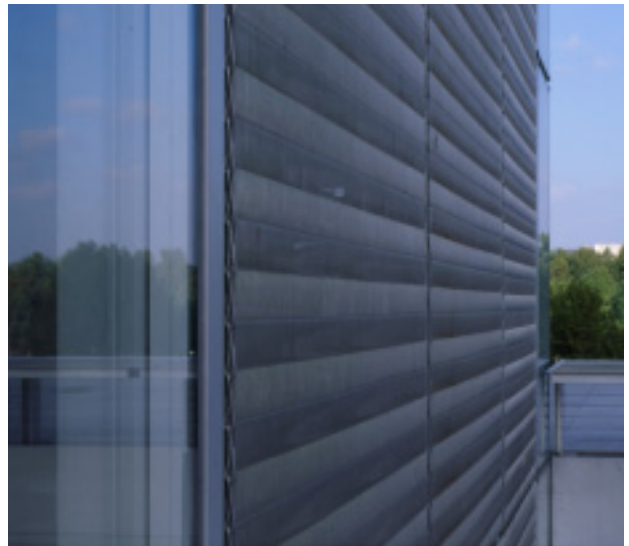
on product design because the limitations and mechanisms of industrial production are different from those of the architect.



Metalworking is a highly precise industry that works within tolerances of microns. Such precision is of little interest to the architect. We work in centimetres and millimetres, a scale that engineers find highly imprecise and bordering on the prehistoric. For our part, the quality we seek lies in another aspect of the product, the visual aspect – the precise quality that heavy industry overlooks. Factories that output wire mesh conversion belts care little for what it looks like. What do they care if the mesh is stained or if the stainless steel is not shiny clean? Mesh conveyors are designed to work with furnaces or for use as a filter. The question of what a material that is often hidden from view actually looks like quite simply does not arise.

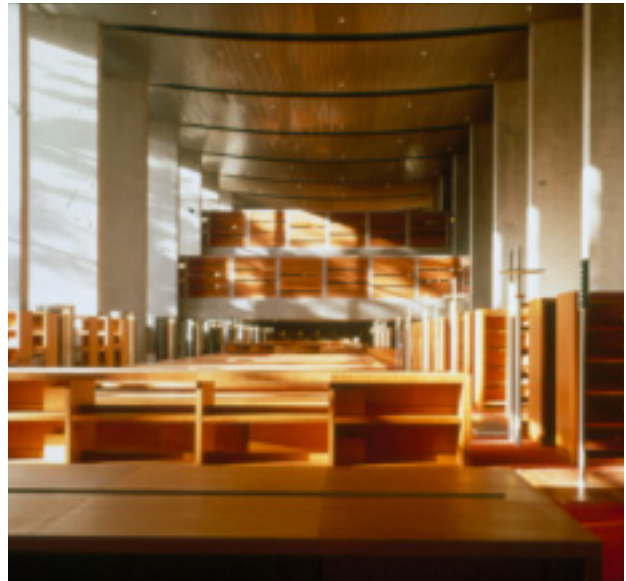
However, the architect, for his part, wants a product as much for its appearance as for its structural qualities. Consequently, he is concerned by steel that rusts, by irregular steel or matt steel, by irregular metal weaves, etc. For our project the mesh would be visible and must therefore have a uniform appearance. Quite clearly there could be no question of having wire whose colour or texture varied from one place to another in square kilometres of weave. Our research into the appearance of the product was carried out in association with a German manufacturer that was well placed to help us for a number of reasons. Firstly, this was a company that had lost a number of contracts with Eastern Europe after the fall of the Berlin Wall and that was on the lookout for new market niches. Also, it was purely a coincidence that the two brothers in charge of the company were from my generation and we discovered that we were all driven by the desire for joint discovery. We worked together for more than two years, not only on the metal weave but also on the design and development of the fasteners, which had to be tested and validated so that they could be installed in the library. The end product and performances achieved were therefore the fruit of our active collaboration and deep-rooted understanding.

This is not a common approach insofar as it is not often that the mesh is made by the same company that manufactures the fasteners. This is an interesting point because in general industrial companies tend to invest relatively small amounts in researching what goes on around their products. Today's builders have lost much of their know-how. We are therefore in the paradoxical situation where industry produces some really great materials but there is nobody out there to make proper use of them. For the library we therefore had to both design the material and the way in which it would be used.



To my mind, the success of our partnership with the German team was built on this global approach taken to all of the elements required to make the best possible use of the metal mesh. In fact, this proved to be very useful research for the company in question because metal mesh is now used widely in new building designs. For those of you who are interested in such things, you will note that modern installation mechanisms for metal mesh are those that were originally designed for the Grande Bibliothèque.

We have used stainless steel widely in the library. The lights, which are now produced by a lamp manufacturer, are better suited for lighting small public spaces, while the blinds use a triple thickness metal mesh. Since we worked on this project we have gone on to design other stainless steel



products: we are working with a Danish team on double-thickness mesh shutters; and are also developing a means of making woven metal mesh that will be highly effective for public areas if there are adequate supports. We are also working on other objects, such as tableware and coasters. Stainless steel certainly offers a lot of potential.

I believe that the design of the library has made a considerable contribution to the development of matte stainless steel in construction work generally. Visually, shiny stainless steel was not at all the right look for a National Library. We used matte stainless steel that looks for the entire world like aluminium, but stainless steel is more solid, more vandal-proof and has good structural properties. We also designed a handsome, deep satin finish giving a softer look than can be obtained from traditional surfaces.

The French National Library in Paris (pages 1-3)  
 Client: French Government represented by  
 the Secretary of State for Public Buildings  
 Architect: Dominique Perrault, Paris, France  
 Fotos: Georges Fessy, Paris, France

Now I would like to move on to a project we completed about a year ago in the Nantes region of France. This was an industrial facility for a French manufacturer of self-adhesive tape. The second largest manufacturer in France, is growing strongly and had to expand in order to honour its contractual commitments.

The site is located in a small rural community with the building plot immediately adjacent to the main road connecting Nantes and Paris. In architectural terms the building was to be a "monster", covering an area of almost 33,000 square metres, with an option for further enlargement to 60,000 square metres. This site was very imposing and if it was to be well received the architecture could not jar with the surrounding countryside. Somehow, the surroundings would have to dominate the plant and not the other way around.

There were many constraints where this project was concerned: economic constraints arising from the fact that this building would have to be built at local market prices – which ruled out the use of stainless steel from the outset – while the whole process promised to be rather chaotic because the structure would be called upon to adapt in real time to company orders.

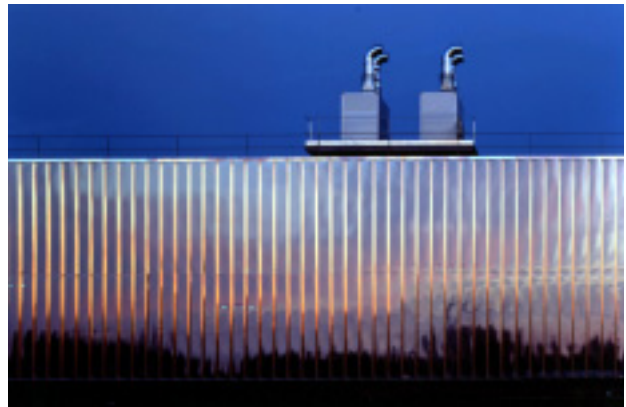
The plan we chose is based on the principle of the crossword grid, with squares reaching out in all directions giving the impression of total randomness. However, in actual fact nothing was left to chance because the intersections are there for a reason. The grid in question was based on squares of 20 m x 20 m that can be developed outwards in every direction. In actual fact, the black squares of the crossword contain indoor gardens: 800 square metres of indoor greenery allowing light onto the factory floor.



The perimeter walls are windowless. A long ribbon of trapezoidal stainless steel runs all around the outside of the plant. The building itself is 7 metres high, consisting of two metal walls measuring 3.50 m each. Losses in a project such as this had to be kept to a minimum, because every centimetre and every centimetre count. A one-metre wide profiled sheet constitutes the cladding component that runs for the whole length of the façade. The idea was to create a single, uniform and uninterrupted wall running all the way round the factory.

We opted for bright annealed stainless steel because the reflections it creates are not mirror-like – that would have been very austere – but instead create a more photographic or artistic effect of deformation and transfiguration. What is more, the profile gives a slight angle that accentuates the optical effect in that the façade does not reflect what is in front of it but instead reproduces myriad images of what stands on either side. This makes for a striking visual effect similar to what is found in a number of Magritte's works – the reflection is simply not what you would expect to see. This confusion, a transfiguration of the real world, gives the building a life of its own quite distinct from the landscape that it alters and transforms.

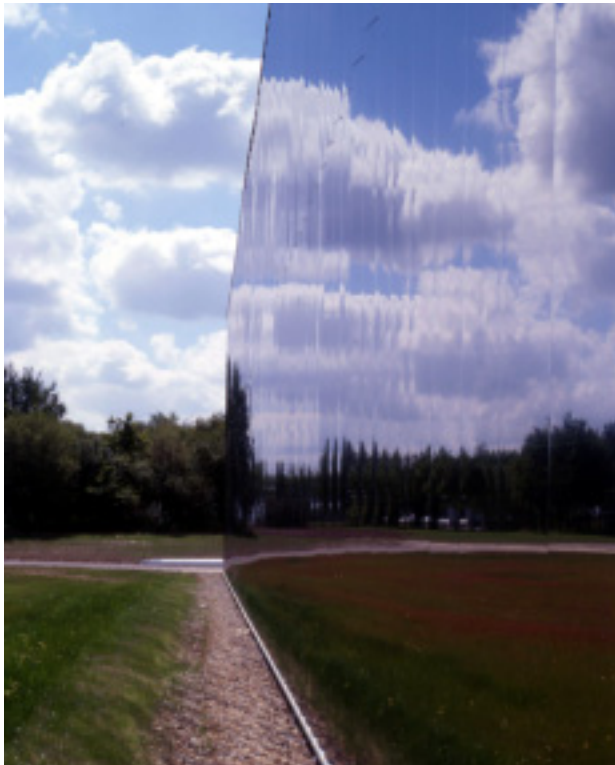
However, the surrounding landscape is sufficiently reflected on the building to give the impression that there is nothing physical there. The colours and effects reproduced by the building change with the weather because the building absorbs all kinds of light. When the sun sets, for example, the northern façade is pink. These variations give an impression of life and harmony with the environment to the point where the building itself virtually disappears in certain lights when it is hidden behind its reflections. I feel that we have been successful in blending this large architectural object into its rural setting.



The inside of the building is constructed on the courtyard principle, with two different types of façade: glazed façades illuminating the workshop areas, and mixed façades combining windows and metal shutters for office areas. All the materials used are industrial grade, which meant that we could build this plant at a price of just FF 2,500 per square metre. Some sections are air conditioned while others are sound proofed. The low price is comparable to the investment that goes into building the storage areas of certain large supermarkets.



To succeed with this kind of project you need a client who is driven by a desire that goes beyond the simple need to build. This client was, of course, looking to keep pace with the company's industrial growth, but it was also keen to mark a new milestone in its development with a symbolic construction. The client was also a little different in that he was an enlightened collector of modern art. He contacted architecture journalists to help him find the architect he wanted. The selection process made it possible to give a human angle to our partnership and to gain a better understanding of the challenges and the underlying purpose of the project.

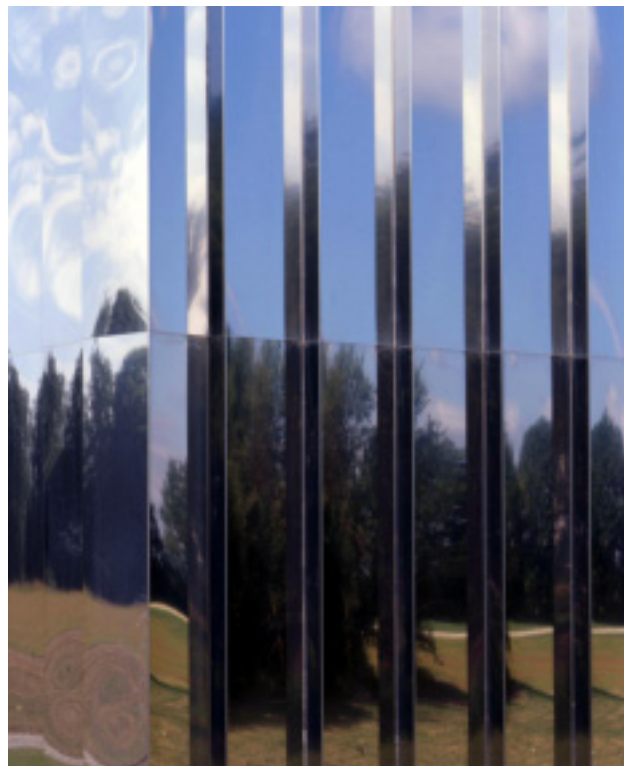


Our collaboration was built on a relationship of mutual trust, and this is particularly important. For example, the façade design consists of nothing more and nothing less than small black vertical lines. This architecture is based on the relationship between light and materials and is impossible to represent visually before building commences. In fact, this makes it rather difficult but not impossible to obtain the necessary building permits. Above all, it presents the architect with a number of problems as he attempts to describe a visual effect, created by the way in which light interacts with the building materials, to a customer who naturally wants to know what he is buying.

We ran a number of tests with samples and full-size prototypes. The unveiling of the prototype was an interesting experience because, for various internal reasons, it was manufactured from brushed stainless steel instead of polished stainless steel that had been selected from the samples. From this we saw that, contrary to popular belief, brushed stainless steel tends to dazzle the viewer and was there-

fore wholly unsuited for use on a building running alongside a major road. Nor did it offer the expected range of clarity or depth, and it tends to react like sheet steel. This brushed stainless steel prototype therefore convinced us that we needed a more sensitive, softer surface finish. Mirror like bright annealed stainless steel provides clarity and depth, reflecting the nuances of light subtly and without dazzle.

I have dwelled on these two examples of successful projects to stress that for a building material to be used in a truly successful way it is not enough for it to be a good-looking material in its own right: you also need to establish a proper dialogue between those who manufacture it and those who use it.



Industrial facility near Nantes (pages 4-7)  
 Client: APLIX S.A., Le Cellier  
 Architect: Dominique Perrault, Paris, France  
 Fotos: Georges Fessy, André Morin