



NOTRE-DAME DE PARIS

THE SECRETS OF THE BUILDERS

A film by EMMANUEL BLANCHARD



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france•5 - 90' & 2 X 45'

PRESENTATION

On 19 April 2019, the eyes of the world were turned on the cathedral of Notre-Dame de Paris, engulfed in flames. All humanity feared this masterpiece of Gothic architecture would be lost forever – the most famous of cathedrals, the embodiment of the genius of medieval craftsmanship.

But Notre-Dame stood firm. Already, architects, engineers, and artisans are planning how to rebuild what was destroyed. The outpouring of emotion sparked by this tragedy merits a fresh look at the history of Notre-Dame de Paris to understand what makes it unique, and the challenges facing its reconstruction.



What secrets did the builders employ to erect this iconic monument of Gothic art more than 800 years ago? How did Notre-Dame emerge over the centuries as one of the world's most celebrated and best-loved buildings?

Through a major historical and scientific investigation into the construction of Notre-Dame, we will stand alongside the builders of yesterday and today to understand the vast architectural, technical, human, financial and political challenges which played out during its turbulent history.

The Secrets of the Builders : Notre-Dame blends powerful drama and scientific rigor based on detailed historical research, resulting in a new filmic language through which to recount history. The film is produced for France 5's prime-time science slot. Historians, scientists, architects and engineers will be interviewed to bring factual elements to this epic story.

This film proposes a new grammar to recount history, and sets out to become the documentary of reference on Notre-Dame de Paris – a legacy film dedicated to this architectural wonder, for which people worldwide have expressed their deep attachment.



CONTEXT

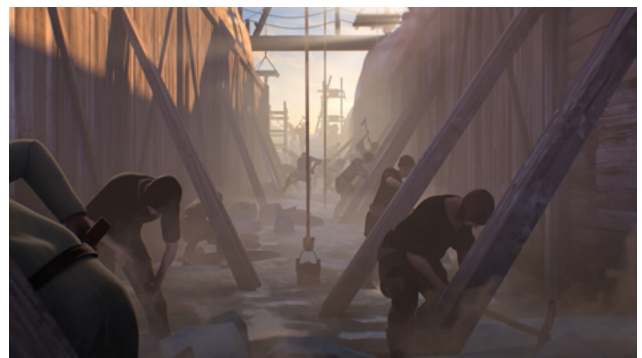
On 19 April 2019, the most famous cathedral in the world, welcoming more than 14 million visitors a year, almost crumbled into ruins. Towering over the Île de la Cité for centuries, it seemed eternal. We had forgotten just how fragile it is. Then its 13th century roof and soaring spire added in the 19th century were engulfed in flames. Part of the vaulted ceiling collapsed. But the structure is still in place. One can still admire the balance of its monumental façade, the virtuosity of the rose windows, and the refinement of its apse.



The worldwide emotion prompted by the blaze led us to question the bond between the public and this monument – a place of worship for Catholics, a national symbol for the French, and a gem of global architectural heritage for all. Ken Follett, author of the best-seller *The Pillars of the Earth*, tells us that for him, Notre-Dame de Paris is “the symbol of European civilization”.



Eight centuries went by between the first stone being laid and the fire which nearly destroyed the building, during which the cathedral has borne witness to the history of France, from its moments of glory to its darkest periods. One has to dive back into this turbulent history to understand why Notre-Dame de Paris became the queen of cathedrals. It is neither the oldest, nor the biggest, but Notre-Dame is the world’s most famous church. It is the most dazzling symbol of Gothic art in medieval Europe, encapsulating in its stones all the idiosyncrasies and innovations of the architecture of the 12th and 13th centuries. It is a beacon in the urban cityscape of the French capital, emanating an emotional power which touches the whole world. This complex and magnificent heritage is now in the hands of the builders who are today taking on the challenge of its reconstruction.

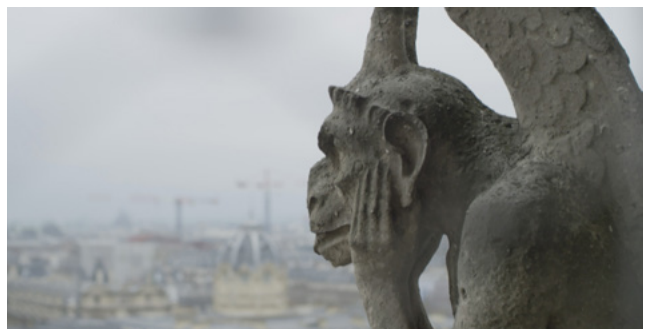




The leading experts in Notre-Dame de Paris – writers, historians, engineers, architects, artisans – all contribute to telling 800 years of this outstanding story, explaining the historical context and the technical secrets of the building with the help of a detailed 3D reconstruction of the cathedral through the ages. This epic journey is illustrated by a fact-based drama told in 3D animation, portraying the destiny of those whose faith, ambition, and genius first built, then embellished, and finally saved the cathedral of Paris.

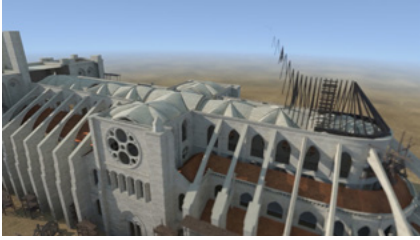
The tale begins in the middle of the 12th century, with those who first conceived of Notre-Dame. Spurred on by their religious beliefs and the ambition to erect a cathedral whose dimensions would surpass the imagination, bishops, monks, stonemasons, and carpenters reinvented the art of construction in the Middle Ages. Their discoveries would soon inspire people across the West. In the face of a spectacular technical challenge, and in competition from other cathedrals that were being built right across Europe, hundreds of men and women joined forces to push the boundaries of human ingenuity.

But the story of Notre-Dame is also one of misfortune. Before the 2019 blaze, the cathedral had to survive wars, epidemics, and the ravages of time. Scorned by the men of the Renaissance, who invented the term “Gothic” to describe what they saw as its barbaric style, it was then deconsecrated and desecrated during the French Revolution, forced to play down its religious symbolism. However, in the 19th century, it was rehabilitated and enjoyed a spectacular renaissance. The writer Victor Hugo glorified it in his novel *The Hunchback of Notre-Dame*, and its restoration was led by architect Viollet-Le-Duc.



This film offers audiences the latest breathtaking images of Notre-Dame de Paris just before the fire, of both the interior and exterior, including aerial shots of the roof and the spire, like a testimony for eternity. The crew also had exclusive access to the partially-destroyed cathedral, resulting in footage that packs a powerful emotional punch.

THE SECRETS BEHIND ITS CONSTRUCTION



This film is an historical and scientific investigation, illustrated by 3D animation sequences, integrating interviews with historians, scientists, engineers and architects, who between them drive the narrative.

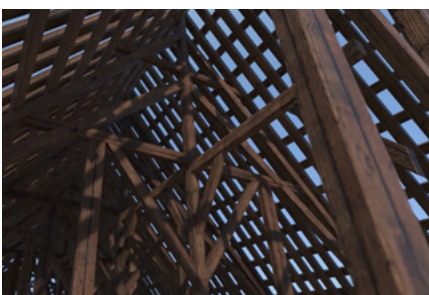
Ever since the fire in April 2019, the cathedral has entered a fresh chapter in its history. Besides consolidating the entire edifice, the collapsed vaulted ceilings need to be rebuilt, along with the roof and a new spire to replace the one built by Viollet-le-Duc in the 19th century. As in the time of the last great restoration project, the architects of today face many questions. Should they rebuild exactly as before? Should they innovate? Or should the building now return as closely as possible to the original structure from the Middle Ages?

More than ever, it is essential to understand the history of this cathedral and its construction.

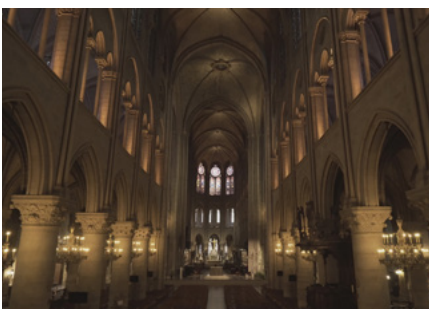
For Notre-Dame conceals more than one secret. When its towers were completed in around 1230, it was the highest cathedral ever built in Europe. How did these medieval stonemasons, with minimal scientific and technical knowledge, succeed in accomplishing this amazing architectural feat, topping out at a height of 69 meters? How did this crazy dream, conceived by a few men in the previous century, become a reality? At a time when Gothic architecture was still in its infancy, how did Notre-Dame become the prime example of this art, spreading its model throughout Europe?

Below are some of the secrets of the cathedral which will be highlighted during our investigation, and which the builders of today must understand to successfully restore Notre-Dame de Paris to its former glory:

WOOD. This is the first challenge facing the builders of today. Should they use wood to rebuild Notre-Dame de Paris? Although Viollet-le-Duc made this choice when he restored the building, the destruction of the spectacular



spire and the roof timbers in a matter of minutes means this is a topic for debate. Rather than depleting the forests of trees to supply the extraordinary quantities of timber required on construction sites in the period, the commissioning authorities had their own forests planted. This was an ideal solution, given that building often spanned decades: The tree reached maturity in time for the construction of the roof. Dendrochronological study of the roof timbers in Bourges cathedral has revealed that all the trees used were exactly the same age!



THE SECRET OF THE VAULTING. Three vaulted ceilings collapsed in the fire on 19 April 2019. Rebuilding them means having a firm grasp of the techniques used by the medieval stonemasons. The keystone in Gothic vaulting is not the last piece put in place, as many believe, but the first. It is located in the center, and the vault is built out from it. The blocks used for ribs are much easier to recut and adjust, if necessary, than the very complex central stone. Experimental archaeology has proved this today.



THE KEY ROLE OF METAL. The fire also highlighted the extensive presence of metal in the cathedral's make-up, with no less than 400 tonnes of lead having melted. The use of iron in construction was not invented in the 19th century: Six centuries before the Eiffel Tower, metal was being used not only to support the great glass windows of Notre-Dame de Paris, but also to bind the stones together. Metal was systematically employed, according to recent archeological discoveries.



A CONSTRUCTION IN STAGES. Unlike other buildings, a cathedral is not built from the bottom up, but from east to west. It starts with the choir and moves towards the façade. Not many people know that in 1220, the architectural project was radically revised because the cathedral was already starting to deteriorate. The more ambitious new project notably included the whole building being raised three meters, which meant dismantling it all and starting again.



RAINWATER MANAGEMENT. The cathedral's rainwater drainage system must handle some 23,000 liters in an average downpour. During a major storm, the weight to be borne is colossal, since the roof area is immense. Without the ingenuity of the builders of Notre-Dame, it would have collapsed long ago. How did they achieve this? The ingenious system of gutters and gargoyles they designed has survived until now, with barely any modifications.



THE KINGS' GALLERY. It was long believed that the kings sculpted on the western façade and destroyed during the Revolution were the kings of Judea. This theory allowed for the stigmatization of the 1789 revolutionaries, who, through ignorance, were said to have destroyed biblical kings, mistakenly thinking they were attacking symbols of the French monarchy. We now know this is not true; they were indeed the kings of France. Art historians recently debunked this well-established myth.



THE BELLS. How does one ring a bell like Emmanuel, weighing 14 tonnes, without bringing the whole tower down? The key to this is the belfry, the wooden structure which does not touch the walls of the tower but which just rests on four stone slabs, absorbing the vibrations.



THE TILT. Notre-Dame de Paris nearly became the French equivalent of the leaning tower of Pisa. Its façade leans forwards by 30 centimeters – visible by the naked eye, once one knows to look. The builders had to wait for the block leaning forward to stabilize before they built on upwards, this time vertically.



STANDARDIZATION. Early on, the builders realized that the standardization of stone blocks made it possible to increase productivity. The rosettes are a perfect example to illustrate this. Just observe the rosettes to demonstrate. The symmetrical repetition of the same patterns, initially drawn, limits the variety of stone templates to produce.



THE OCULI. Viollet-le-Duc was determined to restore Notre-Dame to its initial design. By finding elements of the oculi and observing the irregular shape of the windows, he showed that the building had been reworked in the early 13th century. He restored the windows to their original forms and dismantled the great rose window to turn it through a half-petal.



THE CHIMAERA. Emblems of Notre-Dame, or fantastic symbols of the Gothic Middle Ages? In fact, neither. The chimerae date from the 19th century, and are the creation of Viollet-le-Duc. They say more about that period than the medieval age. The strix, the mournful demon that is the most famous of the chimera, is a pure work of romanticism.

Through seven centuries of history, *The Secrets of the Builders: Notre-Dame* explores the scientific secrets of this amazing architectural saga. Like an historical investigation, illustrated by spectacular 3D animated dramatizations, it brings to life the exploits of the medieval craftsmen and builders.

Some of the world's leading experts – historians, scientists, art specialists, architects and archeologists – will unravel the scientific and technical wonders of the construction of Notre-Dame. These specialists reveal the latest discoveries about its architecture. They show us how, through trial and error, the builders of the Middle Ages invented the rib vault, and designed flying buttresses that allowed them to raise stone walls to new heights. They also explore the role of Viollet-le-Duc in the restoration of Notre-Dame, and take us to the heart of the mysteries of this cathedral that was reinvented in the 19th century.



Together, they look back on that terrible night in April 2019 and outline the challenges of rebuilding this cathedral which they find so inspiring, and to which many have devoted their lives.

Below is the list of the contributors:



Ken Follet (UK) – Passionate about Notre-Dame de Paris, the great British novelist, author of the *Pillars of the Earth*, granted us an exclusive interview in the heart of the partially destroyed cathedral. A great specialist in cathedral building sites in the Middle Ages, he explains why Notre-Dame de Paris is the most symbolic and important construction of medieval Europe.



Tadao Ando (Jap) - Award-winning architect (Pritzker Prize in 1995, Medial Alvar Aalto in 1985 and Carlberg Architectural Prize in 1992). From the age of 14, in the manner of journeymen apprentices of the Middle Ages, he learned his craft from carpenters and other craftsmen. While discovering romanesque and gothic churches on a trip in France, he understood the importance of light that will guide all his work as an architect.



Yann Potin (Fra) – Historian and archivist at the University Paris XIII, he is one of the greatest specialists of the question of the inheritance in France. He analyzes the evolution of the image of Notre-Dame de Paris, which has become an object of national worship and questions the collective emotion that the fire aroused.



Caroline Bruzelius (USA)- Professor of art history at Duke University and a specialist in the Middle Ages, she wrote a reference study on Notre-Dame. Beyond history of art, this charismatic academic reflects on the impact of the architecture on social behaviors.



Philippe Villeneuve (FR) - Chief architect for historical monuments, Philippe Villeneuve is in charge of the conservation of Notre-Dame and a specialist in Viollet-le-Duc. Faced with the very worrying deterioration of the monument, he obtained major funding to restore the spire and the statues on the roof. Some 150 years after Viollet-le-Duc, he is once again confronted with the challenges of restoration. “We will keep the old stones, which may be damaged but are structurally sound. They are like the monument’s expressive wrinkles,” he says.



Stephan Albrecht (ALL) -Professor of History at the University of Bamberg, he led the last major study on the facades of the transepts of Notre-Dame de Paris, upsetting our view of the chronology of the site.



Olivier de Chalus (FR) - A PhD student in architectural history at the University Paris 1-Sorbonne, Olivier de Chalus focuses on the technical application of Gothic architecture innovations in the 13th century. A member of the scientific team in charge of Notre-Dame de Paris, he works on the cathedral every day and knows every stone..



Béatrice de Chancel (FR) - Chief Curator of the Cluny Museum, she is a specialist in revolutionary vandalism that affected Notre-Dame de Paris in 1793, and ensured the preservation of the magnificent heads of kings found in 1977.



François Icher (FR) - Researcher affiliated with the CNRS, he is the most eminent French specialist in cathedral work and the organization of the Notre Dame construction site. Taking his interest in the history of craftsmen beyond the Middle Ages, in his work he questions both medieval corporate systems and the birth of companionship and its evolution until the nineteenth century.

SUMMARY

In the 12th century, in the heart of Paris, an immense construction site would give rise to the world's most famous cathedral: Notre-Dame de Paris. The most visited church in the world, this gem of Gothic architecture, this national symbol for the French was thought to be eternal, until the fire of April 2019 partially ravaged the building, reminding us just how fragile it is. The emotion sparked by this tragedy worldwide makes it key today to look back on this building's incredible history to understand how Notre-Dame became a global icon.

The world's leading experts on Notre-Dame de Paris – writers, historians, engineers, architects, artisans – talk us through the 800 years of outstanding history, explaining the historical context and the technical secrets of its construction with the help of detailed 3D reconstructions of the cathedral through the ages. This epic journey is illustrated by a fact-based drama told in 3D animation, portraying the destiny of those whose faith, ambition, and genius first built, then embellished, and finally saved the cathedral of Paris.



The first stone was laid in 1163, in the heart of Paris. In the 12th century, bishops, monks, and builders were the very soul of Notre-Dame. And it was the ageing bishop Maurice de Sully who came up with the project for this spectacular building. With his protégé, Estienne, a street child with incredible artistic talent, he overcame all obstacles to make his dream a reality. Construction was soon underway, with blacksmiths, carpenters, stone masons, and every guild dedicated to the task in hand. In an age when the wheelbarrow had yet to be invented, these men reinvented the art of construction to create ever taller churches, dedicating monuments to God in His image. Their expertise was shared across Europe and building techniques evolved, with ideas being tested empirically along the way. These builders revolutionized the notion of structure, and introduced a new architectural style, “*ars francigenum*” or “French art”. Despite technical and financial disappointment, the scorn of traditional craftsmen who didn’t believe the challenge was technically possible, on-site rivalries, failures, and accidents, Maurice de Sully and Estienne dedicated their lives to this work that they would never live to see finished.

Other builders took over their task, reaching ever-higher, always trying to be more luminous, more spectacular. They wanted to build a cathedral that would bear witness as much to the glory of God as to the genius of mankind. They traveled across Europe in pursuit of inspiration and to share their techniques, from Cologne to



Canterbury. Stimulated by the competition, as cathedrals rivaling theirs in terms of grandeur and beauty rose up across the continent, these craftsmen mastered wood, stone, iron, and glass like never before. In the company of Lubin the blacksmith, of Samson of Chartres, the old and almost blind master glassmaker, and his daughter Grete, who shows that women also had their hand in the construction of Notre-Dame, the film will reveal the secrets behind the making of the celebrated huge rose windows. Using an invisible iron framework and ribbed vaulting to lighten the structure, in the 13th century it finally became possible to create windows that would allow light to flood inside a cathedral. Some 13 meters in diameter, Notre-Dame's rose windows are a true masterpiece.

The builders of the Middle Ages handed Notre-Dame over to the hands of history, and the cathedral certainly witnessed some turbulent times. At the end of the Middle Ages, Notre-Dame de Paris was not yet the most important cathedral in France. It wasn't even the headquarters of the archbishop. A period of relative peace had come to an end, the Hundred Years War was raging, and Paris was struck down by waves of epidemics. The Renaissance then superseded the sophisticated art of the Middle Ages, which it called Gothic to underline its disdain for its supposedly barbarian characteristics. It wasn't until the 17th century and Louis XIII before Paris's cathedral took on national importance. But the French Revolution did its worst, and Notre-Dame was deconsecrated and renamed the Temple of Reason. Its statues were decapitated, its delicate stonework hacked into. The intention was to wipe out all references to God and the monarchy that had just been overthrown. Debaptised, the great church was renamed The Temple of Reason.



But Notre-Dame was not done. It may have been forgotten and abandoned, but not by all. In 1831, a poet who admired the building opened the eyes of the people of Paris to the terrible state into which it had been allowed to fall. With his celebrated novel, *The Hunchback of Notre-Dame*, Victor Hugo revered the cathedral. In the 19th century, his book, which went onto be a worldwide hit and was adapted into every possible form, turned the cathedral into a universal wonder and aroused the interest of the public authorities in the fate of Notre-Dame. Until that point, only a handful of enthusiasts had been interested in this legacy from the Lower Middle Ages. But now, a huge project was organized to restore the building. It was an ambitious, unique young architect who finally won the commission. With his romantic vision of the Middle Ages, Eugène Viollet-Le-Duc breathed new life back into Notre-Dame, complete with his own personal touch – so personal, in fact, that he even included a statue of himself opposite the spire. No matter. The cathedral had been brought back to life. And with it, the French nation rediscovered its heritage and its history.

A new chapter in the history of Notre-Dame opens today. After the fire in April 2019, it must now be rebuilt. By exploring all the dimensions of the tumultuous history of this edifice – architectural, technical, political, human, financial, and political – this legacy film will contribute to the audience's understanding of what gives Notre-Dame de Paris its aura, and how this can be restored.



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