Rebuilding Notre-Dame de Paris: a technical and scientifical challenge

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3 years after the night of the fire, the cathedral is completly secure.

- The main operation to secure the cathedral was the dismantling of the burnt scaffolding which was realised at the end of 2021.
- Then, craftmens cleared the vaults by removal of the most important remains of the roof. Theses remains are seen as archeologicals items.

Now, the cathedral is ready for its restoration and we are at a key turning point of the project. For 3 years, architects, historians and archeologues have tried to define the best way to conduct this project. What make this particular project so special is that it brings us to think about how can we restore, in the 21th century, a gothic master piece, installed in the center of one of the bigest and of the most famous city in the world?

1. Restore a gothic masterpiece requieres a deep respect of the history

Restoring a gothic masterpiece like Notre Dame requests a deep respect of the history. The project aims to restore the spire and the roof of the central part of the building as it was designed by Viollet le duc. We will use dry wood and lead to realize this structure It's a real challenge because:

- Viollet le Duc designed a very complex structure which has to resist at a stormy weather
- But the spire is also an artistic item with a lot of copper and lead sculptures

The project aims also to restore the gothic roof in wood and lead. We will avoid rebuilding wood frames realised after the medieval période because we are looking to simplify the design of the part of the cathedral.

2. A restoration based on knowledge and current scientific research

This kind of restoration has to be linked with some scientific studies. A national scientific action «Notre-Dame», coordinated by the CNRS and the Ministry of Culture was launched in 2019. This national scientific action considers:

- recovering the knowledge about the architectural elements and materials before the fire;
- extracting and saving the scientific information contained in the preserved materials;
- coupling modelling systems for geometric, structural and acoustic studies;

It comprises 175 research staff from 50 research units organised around 9 working groups: This work is a way to improve our knowledge of the cathedral but also to get a better restoration project.

3. Protecting the workers and the environment: two concerns at the heart of the project

We have to realize this project including contemporary concerns, and especially all environmentals issues because the fire filled the cathedral with a lot of toxic lead dust. We need to have a better system against the fire events. That why, the cathedral will be a little different than before the fire. Architects decide to install a new fire wall system between to wooden structure in the nave and in the choir. This will help to slow down the fire. They also decided to install in the roof a hight pressure water drop sending system. This new installation will help to stop the fire. We have also to take care of the cathedral environment by decreasing the level of lead dust in runoff waters of the new roof. With the help of scientists who are surveying this phenomenom, we are preparing a runoff water filtration system which will be installed few months after the end of the project.