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## **The CNIM Group makes the new Chernobyl arch leaktight**

**The French company has designed, developed and built a membrane that is specifically intended to prevent radioactivity from leaking**

The CNIM Group made the membrane for the new containment for the Chernobyl power station. This unique project is part of a contract that was awarded at the end of 2014, the subject of which was the **qualification** and **manufacture** of a **polyurethane membrane** designed to provide leaktightness between the new arch and the existing buildings. This membrane will protect the atmosphere from any new release of radioactivity from reactor no. 4 that was damaged in 1986.



*Position of the membrane on the East wall (in red)*

According to the terms of the specifications provided by Novarka (a consortium comprising Vinci Construction Grands Projets and Bouygues Travaux Publics), constructor of the new arch, the membrane had to combine **flexibility**, so as not to damage the existing sarcophagus should the arch move, the **strength** to withstand a tornado, **tear resistance and resistance to temperature variations**. Many months of research were needed in order to meet all of these requirements.

### **A membrane of exceptional size**

Result: a membrane of **exceptional size** (1.5 meters wide and 2 kilometers long), capable of **expanding by 55%** to better withstand **winds that can reach up to 300km/h** and incorporating an innovative system for **blocking the spread of any tear that might appear**.

*'The first stage consisted of subjecting various materials to a battery of tests – distortion, elongation, tear resistance – and coming up with a design that met all of the requirements,'* said Dominique Maillhot, project manager. *'After the qualification tests that were completed in April 2016, we set about meeting the technical challenge of mass production. This was a serious challenge, as it was a question of producing 2000 meters of membrane in just a few weeks, whilst strictly adhering to all of the quality criteria: thickness, quality of the material, surface appearance, etc.'*

In order to meet this challenge, CNIM built a new plant, fully automated, on its La Seyne-sur-Mer site where sections of membrane each 16 meters long were produced, which will be installed by Novarka on the Chernobyl arch over the coming months.



*Production line*

Each of these segments is unique, adapted to the precise geometry of the arch and the sarcophagus. CNIM made special molds by machining panels of a material capable of great accuracy in reproducing the shape of the membrane. These molds are then joined together to produce the 16 meter segments.



*Membrane segment*

*'In order to guarantee the performance of the membrane, we devised a thorough ageing and irradiation test program for the materials,'* explained Ludovic Vandendriesche, Head of Nuclear Business. Apart from perfecting the process and manufacture, successful computer simulation of how the membrane would behave was a triumph on the part of CNIM engineers.

#### **A world class industrial tool for large scale projects**

Philippe Lazare, CEO of the CNIM Industrial Systems division, concluded: 'The membrane that has been designed and produced for Chernobyl is further proof of the expertise of CNIM teams and the quality of the group's industrial facilities, which can cope with large scale projects. CNIM engineers are in fact accustomed to facing up to the most exacting technological challenges, such as the ITER project, the Megajoule Laser facility, equipment for the EPR or missile launch systems for the Force Océanique Stratégique (FOST Strategic Ocean Force of the French Navy).

Apart from this membrane, Novarka also chose CNIM to make two other systems for use on the Chernobyl site: a safe handling system and the maintenance carriage for the main deck of the arch, which will be used in the dismantling of the irradiated reactor.

#### **About the CNIM Group**

CNIM designs and builds turnkey high-tech industrial facilities and provides expertise, service and operations support in the environment, energy, defense and industrial sectors. CNIM leads projects and sells equipment worldwide. CNIM relies on stable family ownership, which underwrites its development. The Group has 3,000 employees with revenues in 2015 of €727.0 million, of which exports accounted for 61.3%. CNIM is quoted on Euronext Paris.

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