

## Flaw found in French nuclear reactor

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**A weakness has been discovered in a French nuclear reactor of the type set to be built at Hinkley in the UK.**

France's nuclear safety regulator told the BBC the flaw in the steel housing the reactor core at the nuclear plant being built in Normandy is "serious".

He added that unless he was satisfied with the plans to put it right, he could stop the project.

The fault in the French reactor is thought to be a construction fault, not an inherent weakness in the design.

The troubled European Pressurised Reactor (EPR) under construction in France is one of the standard bearers for the next generation of nuclear power plants.

It is of the same design as that planned for Hinkley C in Somerset and its collapse would

deliver a major blow to the so called nuclear renaissance.

"It is a serious anomaly affecting a crucial component of the nuclear power plant," said Pierre-Franck Chevet, President of the French Nuclear Safety Authority (ASN).

"We have observed a bad chemical and mechanical characteristic," he said.

ASN has ordered the loss-making French state owned reactor manufacturer Areva to conduct a further round of destructive testing on a similar component which will see the 116 tonne pressure vessel head or lid once earmarked for the planned reactor at Hinkley C destroyed in the process.

## Safety and quality

A statement from the French state-owned EDF Group which is behind both projects confirmed new tests are planned intended to "provide the safety authority with all the necessary information to demonstrate the safety and quality of the corresponding equipment".

The problem affects the steel making up the dome-like vessel head and bottom of the structure which has to withstand enormous heat and pressure from coolant water circulating around the core of reactor itself. The pressurised water is then pumped to a steam generator which indirectly turns a turbine creating electricity.

Chemical and mechanical tests on the steel completed in late 2014 found "high carbon concentration, leading to lower than expected mechanical toughness" according to ASN.

The 12.7 meter high pressure vessel which without the head weighs 410 tonnes - is designed to contain huge mechanical and thermal shocks.

But Pierre-Franck Chevet says the tests revealed the resilience of the steel was "far below the prescribed value".

French standards require the vessel to withstand shocks of 60 joules but they found values as low as 30, meaning the component is in parts about half as strong as it should be.

Though there were aspects of the material which were good he said: "On this characteristic of the steel we have 50% of what we want."

The flagship project for manufacturers Areva and the French state owned utility EDF is already way behind schedule and the costs has soared from £2.3billion at the time of purchase to nearer £6 billion now.

ASN has said it will not give its verdict until early next year but EDF maintains work will continue in the meantime.

"It could be yes, it could be no it could be yes with certain conditions," Mr Chevet told the BBC.

## Completion delay

The completion date for the Flamanville reactor in Normandy has already been shifted from 2012 to 2017 and the latest problem could make that worse. If they have to replace both the base of the reactor as well as the lid it could prove costly.

"If they would have to fabricate a new bottom and head and that is not going to be quick," said Steve Thomas, professor of energy policy at Greenwich University who has written extensively about the EPR delays. "Removing the base would be more time consuming and could be prohibitively expensive."

A spokesperson for the Office for Nuclear Regulation said ASN's British counterpart said the two organisations were liaising closely: "ONR expects that any learning that is identified from Flamanville is applied to the Hinkley Point C project."

The statement said: "If ONR is not convinced that an activity is sufficiently safe, it will not [give] permission for the activity."

In an official statement, EDF Energy which has still to make its final investment decision regarding the reactors to be built at Hinkley in Somerset, said there was plenty of time to learn the lessons.

"The equivalent parts which will be used on Hinkley Point C have not yet been manufactured. The way in which they will be manufactured will ensure they meet all the requirements of the UK regulator, the Office for Nuclear Regulation (ONR)," it read.

Pierre Franck Chevet has won respect for his straight talking in an industry once prone to secrecy. "My job is not to reassure the public, my job is to control and regulate nuclear activities" he said, admitting his words were not always appreciated by the utilities.

In a written technical assessment, ASN confirms the two EPR reactors being built in Taishan China were cast at the same forge in Le Creusot in eastern France "using a process similar to that used for the Flamanville EPR reactor pressure vessel".

Mr Chevet will fly to China in the coming weeks to speak to the Chinese regulator there. It could be a tense conversation given the growing interdependence of the two nuclear industries.

The international nuclear consultant Yves Maignac, director of Wise-Paris, who has been critical of the French nuclear programme for many years, said the problem would "raise serious issues of profitability". In a recent analysis of the problems, he wrote: "Economic scenario assessments might show that abandoning the project is cheaper than repair or replacement options, when factors such as the financial costs of further delays, or savings on decommissioning costs if the reactor doesn't go nuclear are included."

He added: "It is serious enough to put the EPR at risk from a technical point of view and it raises big questions about the competence and integrity of the industry."

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