Almost fully recyclable components

Mr. Uwe Arnold from Areva talks about decommissioning nuclear reactors
Due to the turnaround in energy policy, German nuclear power stations are slowly being decommissioned and in other countries reactors are also being taken out of service. What happens to the stainless steel components following the decommissioning of the facilities? In an interview with Stainless Steel World, Mr. Uwe Arnold, expert in the area of decommissioning and component analysis at Areva, explains how stainless steel parts are handled. The company based in Erlangen has over twenty years of experience in the decommissioning of nuclear facilities.
Areva has recently been awarded a contract for the decommissioning of nuclear reactors in Sweden. Corresponding projects are being carried out in France at La Hague, Marcoule and Cadarache and dismantling work is done in the decommissioning of the German nuclear power stations Stade and Würgassen. Mr. Arnold explains that within the scope of the decommissioning of nuclear power stations, very large quantities of materials can be used again: “Following decontamination, well over 90 percent of the waste is released. This means that we test each individual part to determine whether the radiation is not higher than the natural level. Then the component can either be disposed of as normal waste or reused. Only a small proportion of the remaining components must also be placed in the final disposal site, some parts of the reactor pressure vessel.”

For other components of the primary circuit that cannot immediately be released, Mr. Arnold recommends a few years of so-called decay storage, where low radiation exposures decline quickly due to the comparatively short half-life, after which these components can also be either reused or disposed of as normal waste.

**Recyclable materials**

Professional decommissioning assures the possible recycling of a lot of materials, such as stainless steel. “When constructing nuclear power stations, many pipelines are made of high quality stainless steel,” Mr. Arnold says. “Several thousands of tonnes per facility can be almost completely reused after decontamination. Depending on the design, there can also be titanium present. For example: the condensers of some nuclear power stations in coastal areas are reproduced from this high-quality material in order to ensure resistance to seawater. Some of the components of the primary circuit are fully or partly made of classic ferritic steel, as higher structural requirements apply here. A thin stainless steel layer in the interior then ensures resistance to corrosion.”

**Challenges**

Although the technical part of decommissioning nuclear power stations is more or less unproblematic, the long-term decommissioning of nuclear power stations in Germany also faces some challenges, like in the field of efficiency-improvement. Together with the Fraunhofer Gesellschaft, Areva is working on the development of a robot that can handle and - later - also dismantle reactor internals. Until now, the dismantling always took place manually via the remote handling of tools from a platform over the reactor pool. Regardless of such well-functioning technical solutions however, the political environment is still partly lacking. “What we need, for example, is a reliable schedule for the commissioning of the final disposal site for low and intermediate-level waste, the so-called ‘Schacht Konrad’ (Konrad Pit, Editor.),” says Mr. Arnold.

German nuclear power stations were designed to have a service life of at least forty years. Modernizations therefore related more to technology than material. In the safety control system, for example, the analogue technology was replaced by digital in many places. Of course the development of materials is always progressing in nuclear technology and for the construction of new reactors there is close attention to the development.
In 2005 the nuclear power plant Obrigheim stopped operation, decommissioning is ongoing since 2008. Photo: EnBW

Renewable energy
For renewable energies the procedures are slightly different. “On the one hand, the radiological aspects of the requirements on materials in the nuclear power station are special. On the other hand, there are also strict requirements on materials in the area of renewable energy, for example regarding rotor blades or bearings for wind turbines,” Mr. Arnold states. “Areva also produces offshore wind turbines and partially implements the same methods for quality assurance here as with the construction and operation of nuclear power stations, for example ultrasound for non-destructive testing.”

To ensure quality of the product Areva subjects every starting material to comprehensive tests in which experts and the regulatory authorities are involved, before using it. The production processes of the suppliers and subcontractors are also tested. Only after this kind of precisely determined process can the so-called qualification take place. It is necessary to be able to use certain products for the construction of a nuclear power station,” Mr. Arnold concludes.