



The Nuclear Market : an important sector for AD to reckon with

Nuclear Power Plants

The Renaissance of the nuclear industry has already started. Its development speed will increase in the next 2 decades, representing some 500 nuclear plants to be built/rebuilt or life-extended. This quick development is based on 3 main factors:

- development of 'real new build', corresponding to GWe capacity extension, especially in emerging countries, typically China and India
- life extension of NPPs installed in the 70's and 80s, and coming to their end of life, typically USA, France and UK, around 2015-2020.
- 'reopening' of the 'nuclear alternative', after an earlier ban, typically USA, Sweden, Italy, Belgium and maybe Germany

Aubert & Duval applications in nuclear power plants (NPP) encompass many different sectors. But the main interest resides:

1. in the steam generator (SG) : high-added value components such as partition plates, anti-vibration bars and flow-limiters
2. in cooler pumps: forged components in alloyed or stainless materials like Pumps and Motor shafts, thermal barriers, large flanges and disks for flywheel

The possibility for AD to sell its parts or semi-finished products depends on the nuclear technology which is used:

- type of steam generator : for instance, horizontal SGs do not need AVBs, nor partition plates
- type of material used : Nickel base Alloy 690 (UNS N06690), austenitic and ferritic stainless steels (type AISI 304L - 316L - 347 - 405) and low alloyed steels (16MnNiMo 5 - 30M5 - 28 Ni Cr Mo 8-5 - 40NCD 7)
- type of standards required : see below

In order to help you identify which type of NPP investments is to be primarily targeted by AD, we have listed, in the attached presentation, the various technologies currently available on the market, with AD corresponding answers.

ITER

ITER is a multinational project in which 7 countries or group of countries are financially and industrially participating : the EU, the USA, India, Japan, China, Russia and Korea. The site is located in Cadarache (France). ITER is a research/engineering project. It should demonstrate and document how energy can be produced by the fusion, in magnetic confinement (tokamak system), of deuterium and tritium which should be the 'fuel of the future'. ITER is designed to produce approximately 500 MW of fusion power sustained for up to 1,000 seconds. The reactor is expected to take 10 years to build with completion scheduled for 2018; then it should run for another 20 years. And its (revised) cost in the range of 10 billion €. Further information can be obtained at [ITER](#).

In the attached presentation, you will also find a list of products which can be promoted in this technology. You will also find attached JM Lardon's latest report on this issue. Additional information is also available on the following Document base in I-Catcher : [Nuclear market information](#). You are invited to use it extensively.

JHR

The **Jules Horowitz Reactor (JHR)**, also located in Cadarache (France) will be the European material test reactor. Construction of the JHR is funded by a consortium of CEA (50%), Electricité de France (20%), EU research institutes (20%) and Areva (10%). Upon operation in 2014, the JHR will become a versatile research tool, designed to be adaptable for as-yet unimagined uses. Able to accommodate some 20 simultaneous experiments, it will be operated for studies on materials used in the nuclear power reactors of today and tomorrow, as well as testing fuels for current and future reactors.

Further information can be obtained at [Cadarache CEA](#).

As far as we know, this JHR development is not affecting AD sales potential outside France.

Future Nuclear Developments

The next reactor vessels generation (so-called Gen IV) is still being designed. However, these new reactors will be smaller than Gen III reactors, have lower power output and have a modular concept. Several approaches are studied, differing by core reactor technology (type of fuel used) or primary cooling technology (gas cooling, molten salts cooling, sodium cooling). In every case higher temperatures will be achieved in the core and primary cooling systems, leading to material choice evolution. Adequate materials are still under development: specific 9%Cr steels for reactor vessels, ODS (Oxide Dispersion Strengthening) ferritic stainless steels or composite SiC for steam generators for example.

Besides these new concepts some High Temperature Gas cooled Reactors (HTGR), working mainly with helium gas, already exist, as shown with the prototype being built in China. They are examples where AD products can be promoted (choice of alloy 800H for steam generator components for instance).

AD and nuclear certification

The nuclear market requires various certifications according to the technology of interest. AD is already certified and in the process of certification for the following standards :

- RCCM typically used for Areva technologies and its derivatives (thus including China)
- ASME typically used for Westinghouse technologies and its derivatives
- PED typically used for ITER

Be careful !

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