New Build Field Report

AREVA

CUSTOMER UPDATE ON NEW BUILD PROJECTS & ACTIVITIES 6 OCTOBER 2010

The EPR™ reactor is the most scrutinized new generation design in the world, particularly by the media. A recent Google News search turned up almost 1,300 articles for AREVA EPR™ during 2010 alone. It is natural that the EPR™ reactor gets all that coverage because AREVA was the first to build an advanced reactor design. With four EPR™ units under construction and five regulatory reviews underway, AREVA is further along in regulatory processes worldwide than any other advanced design. While all that experience on the front lines of the nuclear renaissance attracts a lot of attention, the most important point is that it directly benefits our customers in terms of lessons learned in licensing and construction, backed by an established and activated supply chain.

OL3 project status

Finland

General view of Olkiluoto 3, Finland

Electrical activities progress: timely execution

External cable laying: making both ends meet

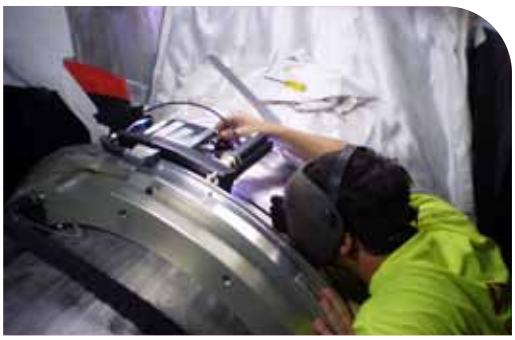
Last July, laying of the first external medium-voltage cables from the Turbine Island (TI) Electrical Building to the Nuclear Island (NI) Safeguard Buildings 2 and then 3 started. These 10kV medium-voltage switchgear cables supply electrical power to the NI area. These operations were followed by the laying of the low-voltage and Instrumentation & Control (I&C) cables, which is now complete.

First 100 kilometers laid!

Thanks to continuous coordination and strong commitment, the progress is running well as the first 100 kilometers of cable was laid in July, including all the medium & low-voltage and I&C cables. Launched at the beginning of the year, the activity continues to ramp up, and will lead to another major activity: cable dressing, glanding and termination. Tests on the cables will be performed to guarantee their integrity prior to handing over to the Commissioning team.

Cable laying, Olkiluoto 3, Finland

Welding of the Primary Circuit launched



MCL welding, Olkiluoto 3, Finland

Welding of the Primary Circuit loop 2 started end of July as planned. This operation follows the introductions of the Reactor Pressure Vessel (RPV), the Reactor Coolant Pump (RCP) and the Main Coolant Lines (MCL) in loop 2 in order to connect these components using a specific welding process developed by AREVA.

The EPR™ reactor consists of 4 primary loops with 12 legs (3 legs per loop): a total of 24 joints to be welded and two weld test coupons to be conducted. Surveys measured all reactor coolant system components at manufacturing completion, prior to the final machining of the Primary Legs and to the definition of the on-site positioning of the components. Each loop is composed of:

- A Cold Leg, completely machined at workshop
- A Cross-over Leg manufactured in one piece with the RCP side bevelled
- A Hot Leg whose RPV side is bevelled

This configuration allows the optimization of site activities, the quantity of joints to be machined and welded on site, and therefore the time schedule. Before welding, the fit-up of the components has to be meticulously checked to ensure perfect alignment in three dimensions due to very narrow tolerance margins. To meet this requirement, a special method is used and specific tools have been developed and installed in the bunker, prior to the MCL introduction.

Piping-related activities: progress update

→ KBA (Chemical & Volume Control System) heat exchangers: ready for piping

The heat exchangers' main function is to lower the primary coolant temperature to a suitable condition for the connected sub-systems. The three KBA Exchangers routing was performed in early July by the Electro-Mechanical team, followed by two weeks of installation work before completion.

Safeguard Building, Olkiluoto 3, Finland

→ Long rock tunnel supports installation launched

Electro-Mechanical (EM) activities including piping are smoothly shifting to a systems organization drive. The EM works progress drive deployed per buildings up to now (reactor, fuel buildings, etc.) will be gradually deployed by systems. This systems organization's priorities and follow-up will be driven by dedicated systems leaders. The two main systems driving EM activities progress will be:

- The PEB system (Essential Water Service System): main cooling water coming from the sea and distributed to the heat exchangers, that will cool the internal system's water.
- The fire fighting system SGB (Fire Water Distribution System): the activities in the long rock tunnel, the last remaining part of the PEB cooling system for EM activities to start, have been launched with the installation of the supports.

The installation

"Deployment on the piping activities in the Nuclear Island, from bottom to top!

Safeguard Building, Olkiluoto 3, Finland

Battery installation: the racks are ready for the cells

Following the installation of battery racks in all Safeguard Buildings, installation of the battery cells proceeded. During the plant's normal operation, these batteries ensure emergency power supply in case of normal power failure in the system.

→ 1st Medium & Low Voltage transformer enclosures installation completed

On August 26, the first Medium & Low Voltage (MV/LV) Transformer enclosures were successfully installed in Safeguard Building. This equipment encloses the transformers and covers the live high-voltage terminal. The cables' dressing, glanding and termination are completed on these transformers and the inspection and cable tests are ready to be performed.

FA3 project status

France

General view of Flamanville 3, France © EDF

SIS pumps introduction, France

Introduction of the SIS pumps

The first two Safety Injection System (SIS) pumps have been introduced in the -9.60m level of Safeguard Auxiliary Buildings on 24-25 August. SIS pumps are used for safety injections, and as an extra heat removal system when stopping the reactor. They weigh 12 tons and can work with a flow rate of 217m³/h for MHSI (Medium Head Safety Injection) pumps or even 564m³/h for LHSI (Low Head Safety Injection) pumps.

Final heat treatment for the FA3 Reactor Pressure Vessel

The stress-relief heat treatment of the FA3 EPR™ RPV is an important step that ends thousands of hours of welding to manufacture this vessel, one of the major pieces of the Flamanville EPR™ plant. This operation, completed in July in the 600t gas oven (renovated in 2008) of the St Marcel plant, consisted of relieving the stress due to the welding of the circular seals and stainless undercoat of this component. This vessel of 420t weight, 7.5m maximal overall dimension (including nozzles), and 10.6m long, has been the most complex piece treated in the oven to date.

Reactor Pressure Vessel in the oven, Chalon/ St Marcel plant, France

→ The heat treatment of FA3 pressure vessel is a complex operation

It consists of maintaining a 420-ton piece of equipment in a temperature range between 595°C and 625°C for 4-8 hours. The FA3 pressure vessel was kept between 600°C and 622°C, and required 7,100m³ of natural gas for this operation.

TSN 1&2 project status

China

The installation

"The third liner ring was installed on July.

General view of the Taishan project, China

On August 6, AREVA CEO Anne Lauvergeon's visit to the work site was the occasion to highlight the impressive progress made on the Taishan Units 1 and 2, in particular the civil engineering works. The Taishan 1 & 2 Project is proceeding at a very steady pace. For example, the first concrete was poured at the Taishan 2 site more than two months ahead of the scheduled date.

The containment liner for the base slab of Unit 2 has now been completed with a level of quality exceeding that of Unit 1, according to TNPJVC (Taishan Nuclear Power Joint Venture Company).

On the worksite for unit 1, the third liner ring was installed on July 28, which gives the reactor building a completely new appearance, with a combined height of 12m.

Project Profiles

Name	Olkiluoto 3 (OL3) Finland	Flamanville 3 (FA3) France	Taishan 1 & 2 (TSN 1&2) China
Customer	Teollisuuden Voima Oyj (TVO)	Electricite de France (EDF)	China Guangdong Nuclear Power Holding Corp. Ltd. (CGNPC), represented by the Taishan Nuclear Power Company (TSNPC)
Scope of work	1 EPR™ unit (AREVA - Siemens Consortium)	1 EPR™ NSSS (AREVA)	Design & procurement for 2 EPR™ units (AREVA)
Net electric output	1,600 MWe	1,630 MWe	1,660 MWe
First concrete	October 2005	December 2007	End 2009
Nuclear Operations (Starting after reactor fuel loading)	End 2012	Project Lead EDF - "*The target for beginning marketable output is now set at 2014*" - EDF Press Release, July 30, 2010	Unit 1 - 2013

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