



4th MDEP Conference on new reactor Design Activities

RPVI Vibratory Behavior Test Implementation


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Summary

- ▶ *MDEP/EPROOG exchanges on EPR commissioning*
- ▶ *FPOT transposition*
- ▶ *RPVI FPOT context*
- ▶ *RPVI FPOT program*
- ▶ *RPVI FPOT transposition progress*
- ▶ *Conclusion*

MDEP/EPROOG exchanges on EPR commissioning

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- ▶ **2013-06** Shenzhen **MDEP/EPROOG workshop**
 - ◆ MDEP Regulators : National regulations and practices
 - ◆ EPR Vendor : EPR commissioning program and organization, EPR FOAK tests, Preliminary list of potential First Plant Only Tests (FPOT)

 - ▶ **2013-11** Paris **MDEP/EPROOG meeting**
 - ◆ EPR Vendor : Detailed description of the FPOT on “RPV-internals vibration”
Short description of others

 - ▶ **2015-10** **MDEP “*Common Position addressing commissioning*”**
 - ◆ MDEP Regulators : Guidance for Licensees seeking to credit FPOT (draft issue)

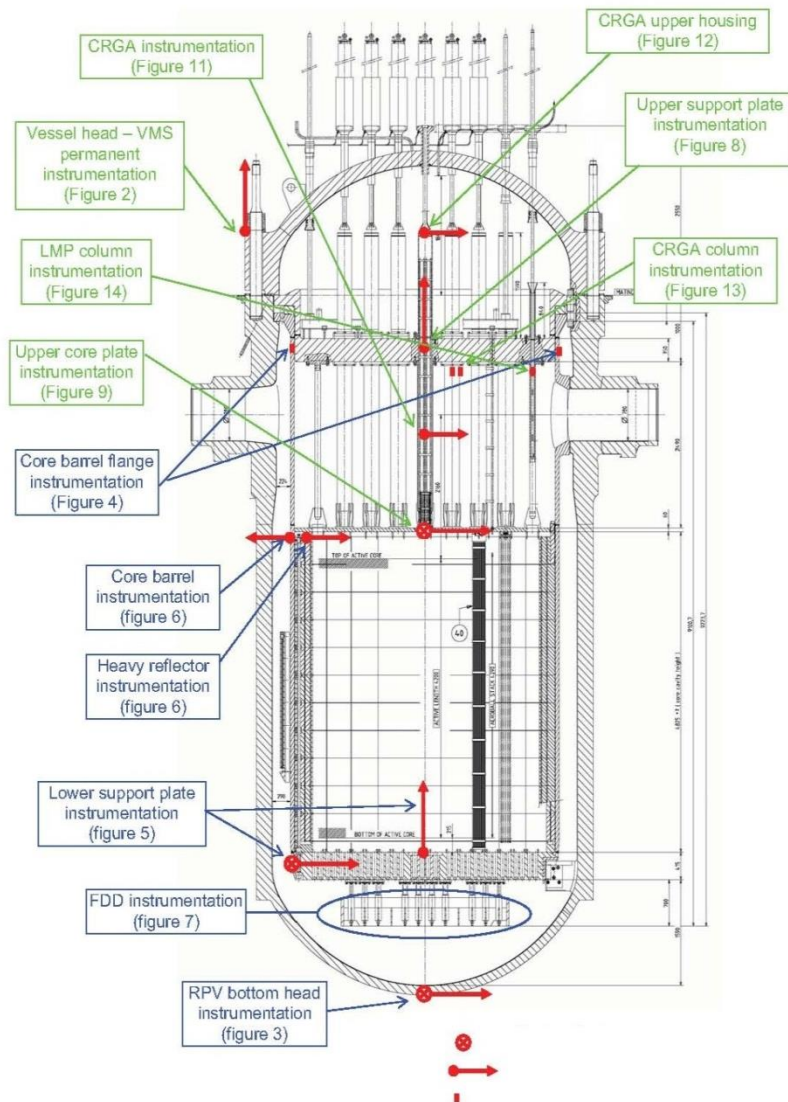
 - ▶ **2015-11** Paris **MDEP/EPROOG meeting**
 - ◆ EPR Vendor : Process for recognition of FPOTs
 - ◆ EPROOG : Comments on the MDEP draft “*CP addressing commissioning*”

 - ▶ **2016-10&12** Paris+TSN **MDEP meetings with EPROOG partly**
 - ◆ MDEP Regulators : Finalization of the organization of TSN1 FPOT “RPVI” btw Regulators
 - ◆ EPROOG : Credit or not of FPOT “RPVI” , preparation status of TSN1 “RPVI”

FPOT transposition

- ▶ EPROOG identified 4 FPOT test sequences eligible as FPOT
- ▶ The RPVI vibration measurement test was selected by Licensees for the transposition to NOAK units :
 - ◆ A complete program has to be implemented on the FOAK unit
 - ◆ NOAK units may credit FOAK measurement results provided proper process being rolled-out and so, may limit tests to RPVI visual inspection
- ▶ So far, 6 EPR units are concerned by this test.
 - ◆ Olkiluoto 3 was first considered as FOAK unit. So, OL3 was prepared for tests and is implementing measurement tests.
 - ◆ Then, Taishan 1 turned FOAK, so was prepared and is implementing tests

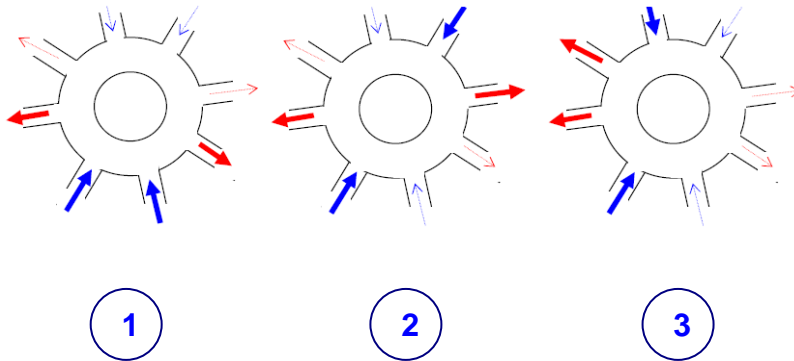
RPVI FPOT context



- ▶ EPR RPV Internals include a few design evolutions compared to existing plants
- ▶ NRC Regulatory Guideline 1.20 is applied to assess “Prototype” RPVI vibratory behavior :
 - ◆ Implementation of temporary instrumentation during HFT to monitor fluid-induced vibrations in cold & hot conditions
 - ◆ Visual inspection of RPVI is performed before & after measurement tests to check the absence of structural damages

RPVI FPOT program

- ▶ The RPVI FPOT test procedure covers the following test configuration :



Test number	Configuration	Characteristics	
		Temperature	Pressure
1	1 pump	60°C	27 bars
2, 3, 4	2 pumps : 3 cases		
5	3 pumps		
6	4 pumps		
7	Transient 4/0 pump		
8	1 pump	120°C	27 bars
9	4 pumps		
10	1 pump	200°C	70 bars
11	4 pumps		
12	1 pump	303,3°C	155 bars
13, 14, 15	2 pumps		
16	3 pumps		
17	4 pumps		
18	Transient 4/0 pump		

RPVI FPOT transposition progress

▶ EPROOG position on TSN1 RPVI

- ◆ TNPJVC (China) : credit of TAISHAN-1 FPOT on TAISHAN-2
- ◆ TVO (Finland) : no credit of TAISHAN-1 FPOT on OLKILUOTO -3 (instrumentation in place)
- ◆ EDF (France) : credit of TAISHAN-1 FPOT on FLAMANVILLE-3
- ◆ NNB (UK) : credit of TAISHAN-1 FPOT on HINKLEY POINT C-1&2

▶ All site preparation works, sensors installation/calibration and a visual inspection of TSN1 vessel internals were done prior Hot Functional Tests

▶ Measurement tests were then carried-out during Hot Functional Tests


▶ 2017 March 27-31 TSN1 site :

◆ During a **NNSA** inspection scheduled at the beginning of HFT, an observation was carried out by the overseas Regulators (**STUK/ASN/ONR**) with presence of overseas Licensees (**TVO/EDF/NNB**) of part of the TSN1 RPVI test performed by

AREVA/TNPJVC

◆ MDEP publication after this observation : “Based on their observations, the Regulators did not identify any fundamental reasons for not crediting TSN1 FPOT results at this stage”

RPVI FPOT transposition progress

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- ▶ At the end of TSN1 HFT, after vessel opening, RPVI are being extracted from the vessel and post HFT visual inspection is being conducted (VT step is mandatory w.r.t. the validation of RPVI in the frame of RG 1.20 program)
 - ▶ TSN1 RPVI test results analysis is on-going and the Test Report is under preparation by AREVA
 - ▶ TSN1 Test Report and RPVI final inspection report will complete the **Transposition Reports** prepared by overseas Licensees (content of the Transposition Report already discussed between Licensee/Regulator in each country)
 - ▶ As the instrumentation was almost completely installed before CFT, OL3 decided to go on with the test

▶ WAY FORWARD

- ◆ Licensees complete their transposition files and transmit it to their respective Regulator for crediting TSN1 FPOT “RPVI” results in their commissioning program

▶ CONCLUSION

- ◆ Positive example of MDEP supporting Regulators to work together to benefit EPROOG

Thanks for your attention