Differences on Requirements for Manufacturing of Forgings

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Tsuyoshi Nakamura
General Manager of Nuclear Energy Dept.

THE JAPAN STEEL WORKS, LTD.
Contents

1. Introduction of JSW Muroran Plant
2. Manufacturing Experience of Nuclear Forgings
3. Main Applicable Codes for Forgings
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1. Introduction of JSW Muroran Plant
2. Manufacturing Experience of Forgings for RPV & SG

Total Number of Delivered Forgings until 2010
- RPV Forgings: 609 pcs.
- SG Forgings: 1,509 pcs.
- Total: 2,118 pcs.

Estimation
- RPV Forgings
- SG Forgings

Replacement of Steam Generator
Replacement of PWR Closure Head
Nuclear Renaissance
Present Estimation

New Construction

Japan: 58 plants
Overseas: 20 countries, 165 plants

Year:
- 1970
- 1972
- 1974
- 1976
- 1980
- 1982
- 1984
- 1986
- 1988
- 1990
- 1992
- 1994
- 1996
- 1998
- 2000
- 2002
- 2004
- 2006
- 2008
- 2010
- 2012
- 2014

Number of Delivered Forgings (pcs.)
- 0
- 50
- 100
- 150
- 200
- 250
- 300
### 2.1 Manufacturing Experience of Forgings for EPR

<table>
<thead>
<tr>
<th>Component</th>
<th>No.</th>
<th>Project</th>
<th>Olkiluoto -3</th>
<th>Flamanville -3</th>
<th>Taishan -3</th>
<th>Taishan -1</th>
<th>USA</th>
<th>TBD</th>
<th>Penly -3</th>
<th>UK</th>
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● : Forging  ○ : Under manufacturing  * : Before manufacturing

TBD: To Be Determined
## 2.2 Manufacturing Experience of Forgings for AP1000

### RPV
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<th>Component</th>
<th>No.</th>
<th>Project</th>
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<th>Vogtle -3</th>
<th>TBD</th>
<th>TBD</th>
<th>Xianning -2</th>
<th>Tao Hua Jiang</th>
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<th>Tao Hua Jiang</th>
<th>Pengze -1</th>
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<td>○</td>
<td>○</td>
<td>□</td>
<td>-</td>
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</tbody>
</table>

- ●: Forging
- ○: Under manufacturing
- *: Before manufacturing

TBD: To Be Determined
3. Main Applicable Codes for Forgings (1/2)

Applicable code is different for each reactor design and location of site.

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>Location of Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP1000</td>
<td>ASME</td>
</tr>
<tr>
<td>ABWR</td>
<td>JSME, ASME + Country’s Rules</td>
</tr>
<tr>
<td>EPR</td>
<td>RCCM</td>
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</tbody>
</table>
3. Main Applicable Codes for Forgings (2/2)

(Example of Country’s rule)

AP1000 projects in China

1) Special mechanical properties are required for forgings, additionally.

2) Many production weld test materials are required.

Projects in France

1) Application of ESPN (Order of December 12, 2005 related to Nuclear Pressure Equipments) is required.

Projects in UK

1) Application of ISO17025 (Qualification of Test Laboratory) is required.
JSW has many experience to receive vender inspection (quality assurance audit/survey).

Number of Times of QA Audit at JSW Muroran
4. Vendor Inspection (2/2)

Number of times of QA audits at JSW Muroran for 2007 to 2011

- **Japan, 17**
- **North America, 17**
- **Europe, 14**
- **Asia, 2**

- **Customer**
- **Regulator**
  - ASME/ANIA
  - DEP
  - TUEV
  - NRC
  - ISO9001

- **Owner**
5. Expectation to MDEP’s Activities

JSW (as material manufacturer) expects to MDEP’s activities,

- To harmonize requirements of Code and Standard for material manufacturing.
- To simplify the process of manufacturer qualification.
Thank you
for your attention!

The Japan Steel Works, Ltd.