

Differences on Requirements of Codes for Manufacturing of Forgings

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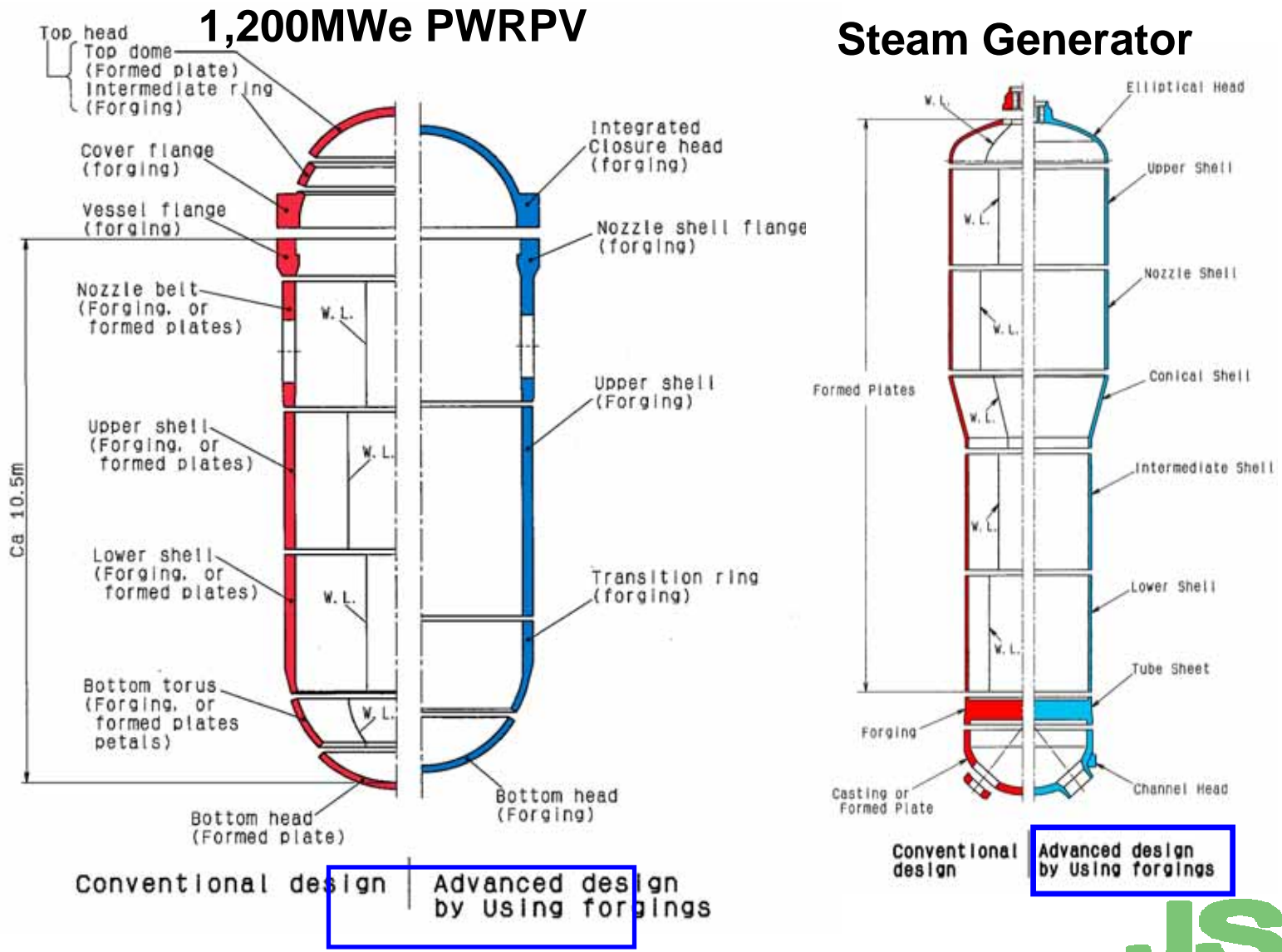
General Manager of Nuclear Energy Dept.

THE JAPAN STEEL WORKS, LTD.

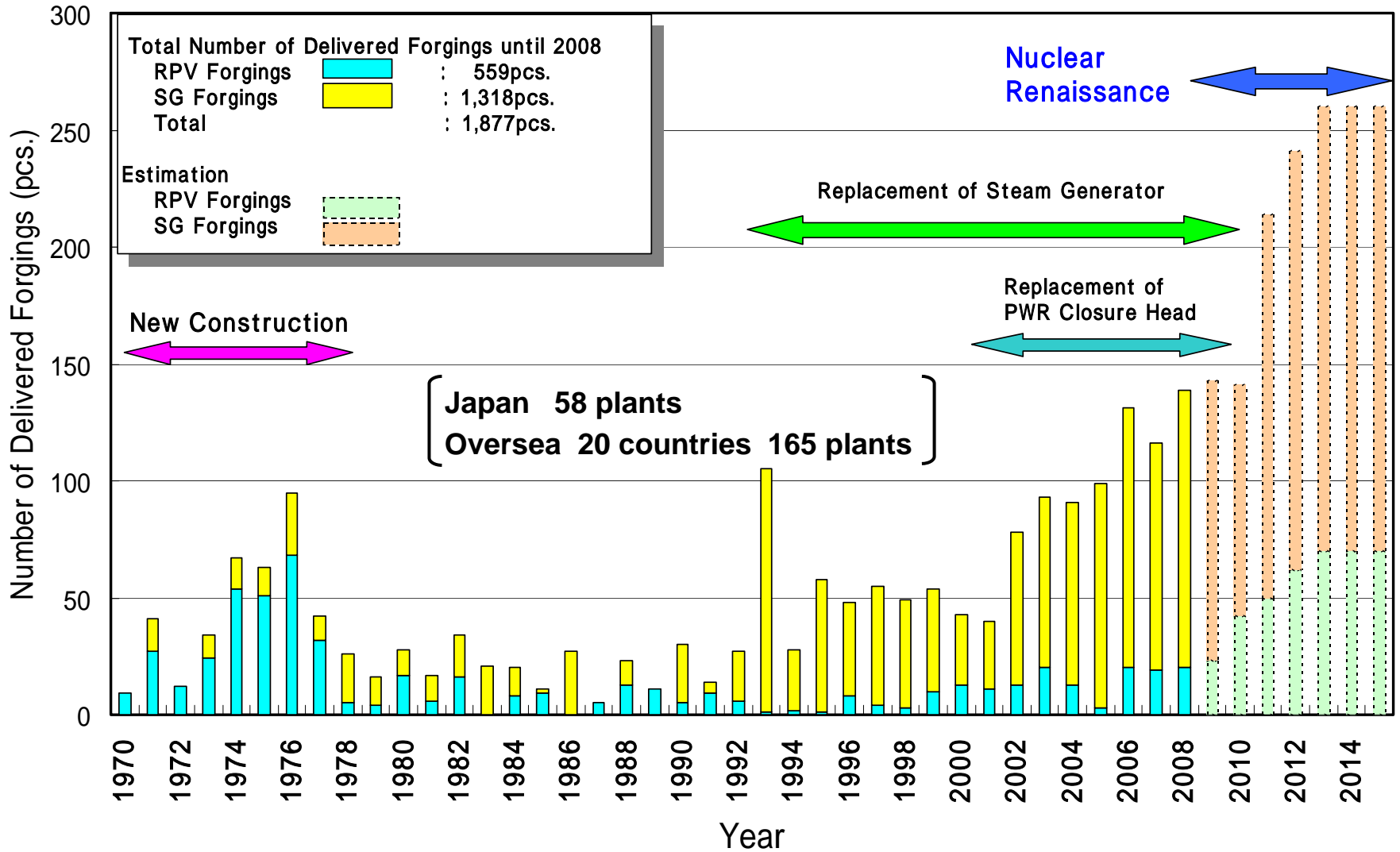
- 1. Manufacturing Experience of Nuclear Forgings**
- 2. Main Applicable Codes for Forgings**
- 3. Differences on Requirements of Codes**
- 4. Vender Inspection**
- 5. Expectation to MDEP's Activities**

1. Manufacturing Experience of Nuclear Forgings

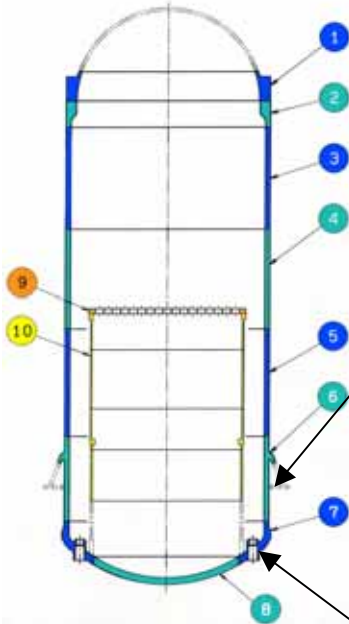
1.1 Development of Large Integrated Forgings



1.2 Manufacturing Experience of Forgings for RPV & SG



1.3 Manufacturing Experience of Forgings for ABWR



Shell 4 with skirt



Bottom Petal with Nozzles

		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
No.	Plant Item	Kashiwazaki -6	Kashiwazaki -7	Lungmen-1	Lungmen-2	Hamaoka-5	Shiga-2	Shimane-3	Ohma-1	STP-3	STP-4
1	Cover Flange	F	F	F	F	F	F	F	F	*	*
2	Shell Flange	F	F	F	F	F	F	F	F	(F)	*
3	Shell No.1	-	P	-	-	-	F	F	F	-	-
4	Shell No.2	-	P	-	-	-	F	F	F	-	-
5	Shell No.3	F	F	F	F	F	F	F	F	(F)	*
6	Shell No.4	F	F	F	F	F	F	F	F	(F)	*
7	Bottom Petal	F	F	F	F	F	F	F	F	(F)	(F)
8	Bottom Dome	F	F	F	F	F	F	F	F	(F)	*
9	Core Grid Disk	F	F	F	F	F	F	F	F	(F)	*
10	Shroud	-	-	-	-	-	-	F	(F)	-	-

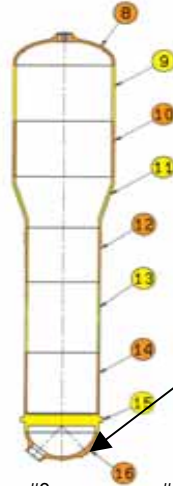
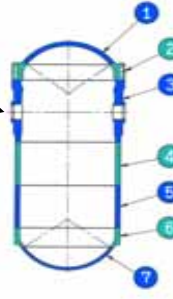
F: Forging P: Plate (): Under manufacturing *: Before manufacturing

1.4 Manufacturing Experience of Forgings for EPR



Nozzle Shell Flange

RPV



4-SGs



Primary Head

Component	No.	Product	Project					
			#1 Olkiluoto-3	#2 Flamanville	#3 TaiShan-1	#4 TaiShan-2	#5 USA	#6 TBD
RPV	1	Closure Head	F	-	-	-	-	*
	2	Head Flange	F	F	F	-	-	*
	3	Nozzle Shell Flange	F	F	F	(F)	(F)	(F)
	4	Upper Core Shell	F	F	F	-	-	*
	5	Lower Core Shell	F	F	F	-	-	*
	6	Transition Ring	F	F	F	-	-	*
	7	Bottom Head	F	-	-	-	-	*
SG	8	Elliptical Head	F	F	F	-	*	-
	9	Upper Shell	F	-	-	-	-	-
	10	Nozzle Shell	F	-	-	-	-	-
	11	Conical Shell	F	F	F	*	*	-
	12	High Shell	F	-	-	-	-	-
	13	Intermediate Shell	F	-	-	-	-	-
	14	Lower Shell	F	-	-	-	-	-
	15	Tube Sheet	F	F	F	-	*	-
	16	Primary Head	F	F	F	*	*	-

F : Forging () : Under manufacturing * : Before manufacturing

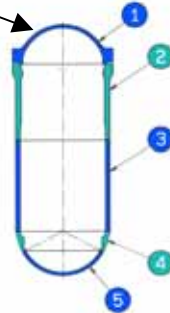
TBD: To Be Determined

1.5 Manufacturing Experience of Forgings for AP1000

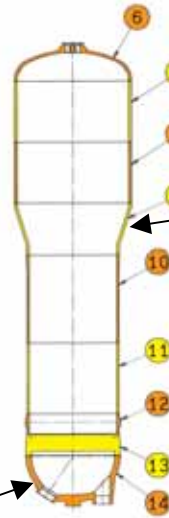


Closure Head

RPV



2-SGs



Transition Cone



Channel Head

Component	No.	Project Product	#1	#2	#3	#4
			Sanmen-2	Vogtle-3	TBD	TBD
RPV	1	Closure Head	F	(F)	*	*
	2	Vessel Flange Shell	F	(F)	*	*
	3	Lower Shell	F	(F)	*	*
	4	Transition Ring	F	(F)	*	*
	5	Bottom Head Dome	F	(F)	*	*
SG	6	Upper Head	F	*	*	*
	7	Upper Shell B	-	*	*	*
	8	Upper Shell A	-	*	*	*
	9	Transition Cone	F	*	*	*
	10	Lower Shell C	-	*	*	*
	11	Lower Shell B	-	*	*	*
	12	Lower Shell A	-	*	*	*
	13	Tube Sheet	F	(F)	*	*
	14	Channel Head	F (Separate type)	(F)	*	*

F : Forging () : Under manufacturing * : Before manufacturing

TBD: To Be Determined

2. Main Applicable Codes for Forgings

Applicable code is difference for each reactor design.

AP1000 : ASME

ABWR : JSME, ASME

EPR : RCCM, ASME

Customers require sometimes to apply bi-codes for manufacturing of forgings.

3. Differences on Requirements of Codes

There are differences of requirements on codes for manufacturing of forgings.

- **Material Specification (Chemical Compositions, Mechanical Properties)**
- **Qualification of Personnel (NDE, Tests)**
- **Calibration Procedure for Tests & Examination Equipments (NDE, Mechanical Tests, Length Measuring , Temperature Measurements, etc.)**
- **Tests & Examinations Procedure and Acceptance Standards**
- **Units for Measuring**
- **Scope of Vender Inspection**

4. Vender Inspection

JSW has many experience to receive vender inspection (audit/survey) by,

USA : NRC, ASME

France : DEP

Germany : TUEV

Owners

Customers (Reactor Venders, Fabricators)

5. Expectation to MDEP's Activities

JSW (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.