

# QA Criteria IV : Process Control & Inspection



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## 9. Control of Special Processes

# 9. Control of Special Processes

## I. Area of Review

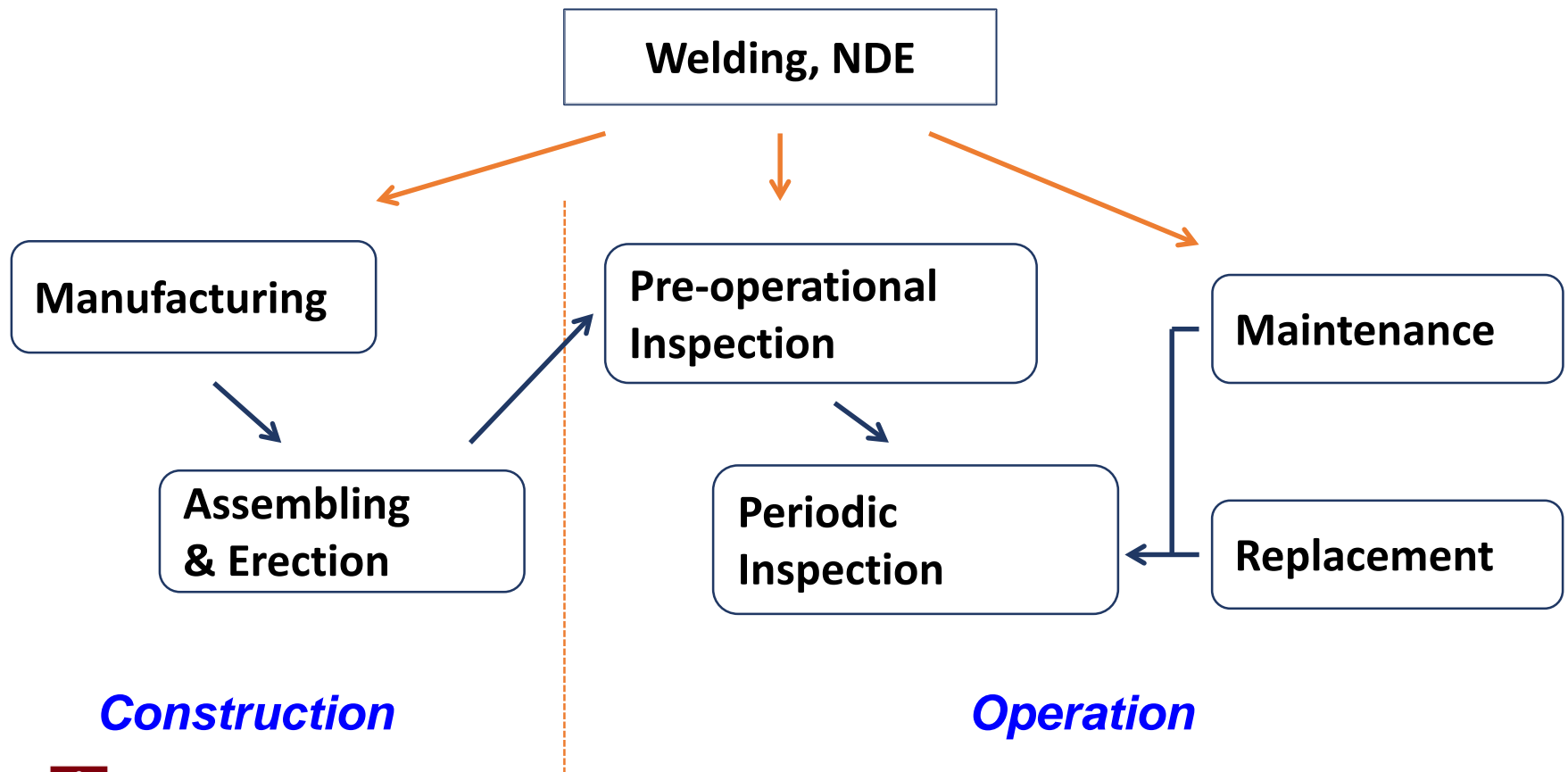
- *Special processes\** are performed by *the qualified personnel* using applicable standards, criteria, specifications and other *procedures suitable* for the special requirements.

*\* Special process – a process, the results of which are highly dependent on the control of the process and/or the skill of the operators, and in which the specified quality cannot be readily determined by inspection or test of the product such as welding, heat treating, nondestructive examination, painting, etc.*

# 9. Control of Special Processes

## I. Area of Review (continue)

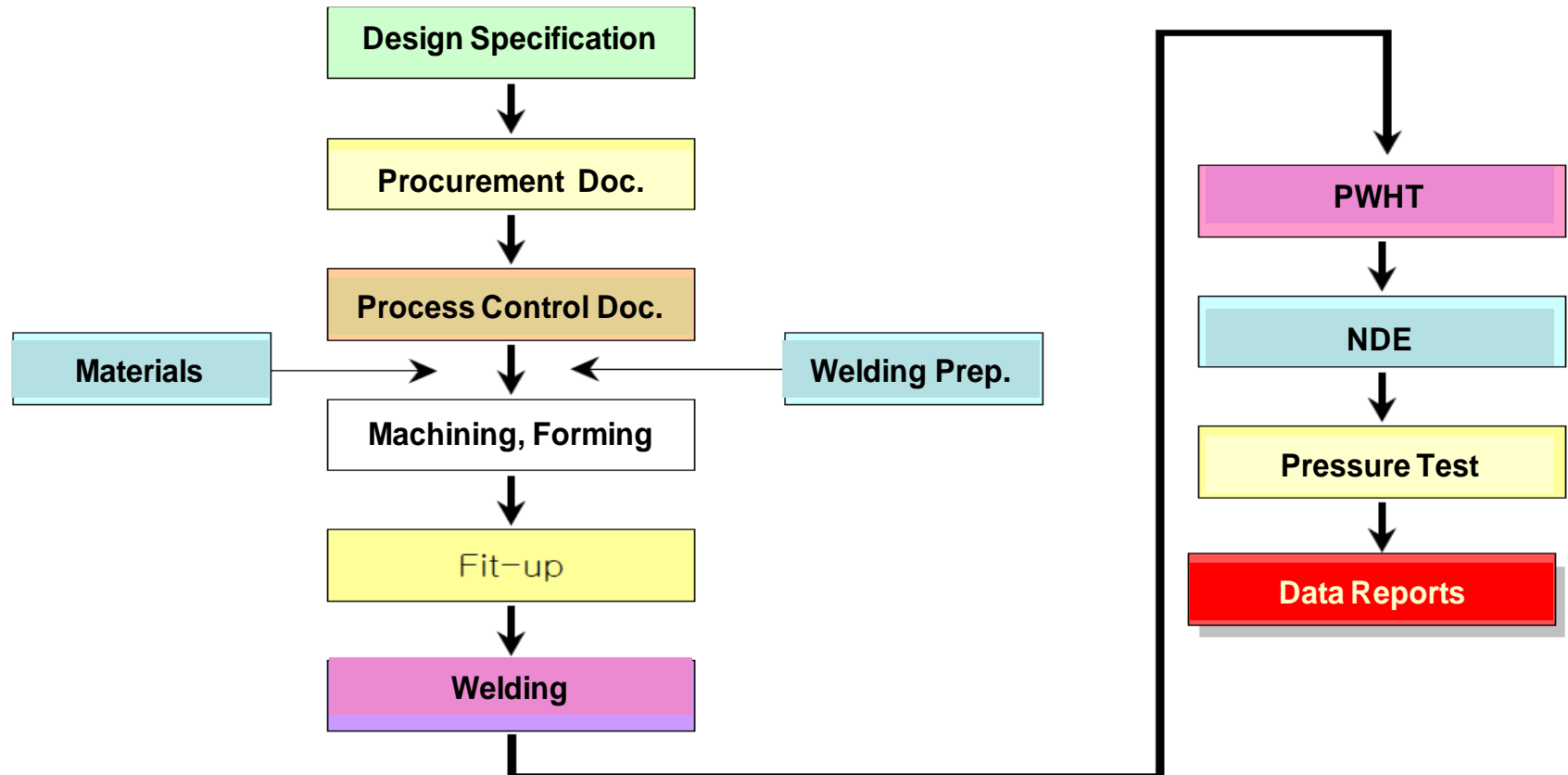
### ❖ Application of Special Process



# 9. Control of Special Processes

## □ I. Area of Review (continue)

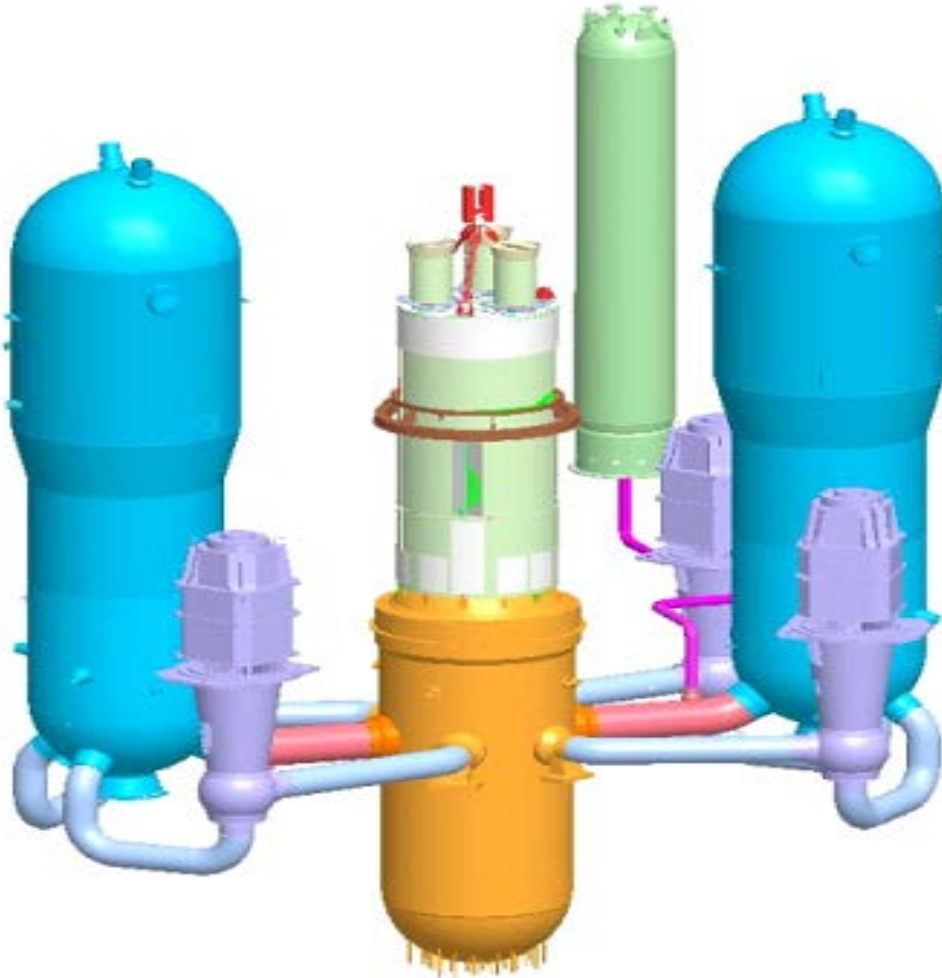
### ❖ General Manufacturing Process



# 9. Control of Special Processes

## I. Area of Review (continue)

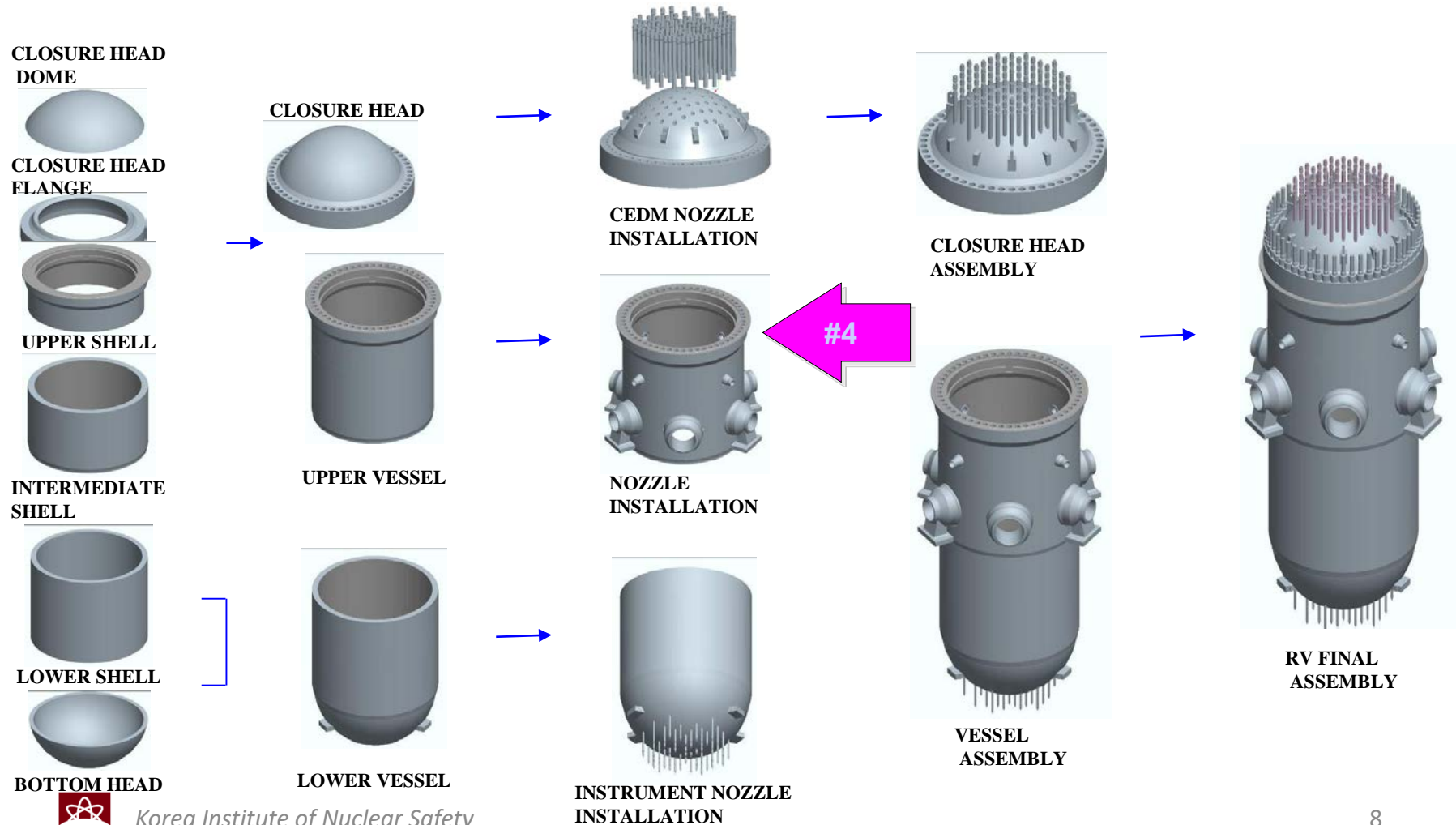
### ❖ Major Components



# 9. Control of Special Processes

## I. Area of Review (continue)

### ❖ General Manufacturing Process





# 9. Control of Special Processes

## I. Area of Review (continue)

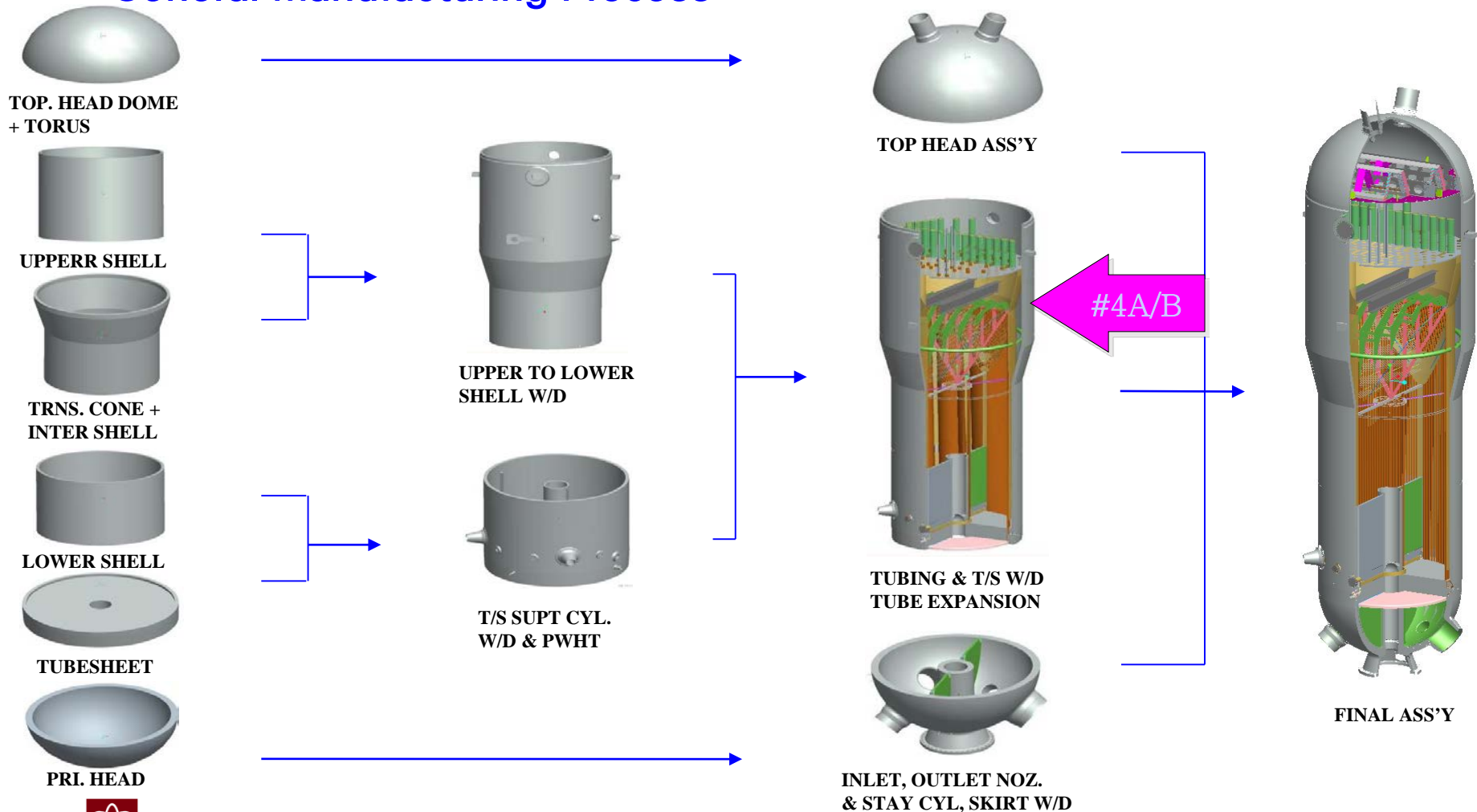
### ❖ General Manufacturing Process



# 9. Control of Special Processes

## I. Area of Review (continue)

### ❖ General Manufacturing Process



# 9. Control of Special Processes

## Manufacturing Status of Shin-Kori #3/4 Steam Generator



#3A : Tubesheet Drilling has been complete.



#3B : T/S Cladding & Machining has been completed.



#4A : Tubesheet Cladding has been completed.



#4B : QHT of Forging Material has been completed.



Doosan Heavy Industries & Construction



Korea Institute of Nuclear Safety

# 9. Control of Special Processes

## II. Requirements

- 100 Basic
  - *Special processes* shall be performed by *qualified personnel* using *qualified procedures* in accordance with specified requirements
- 200 Process control
- 201 Special Processes
  - *Controlled by* instructions, procedures, drawings, checklists, travelers, or other appropriate means
  - Conditions necessary shall included (*proper equipment, controlled parameters of the process, specified environment, and calibration requirements*)



# 9. Control of Special Processes

## II. Requirements (continue)

- 202 Acceptance Criteria
  - Acceptance criteria for the process, shall be *specified or referenced* in procedures or instructions
- 203 Special Requirements
  - shall be *specified or referenced*
- 300 Responsibility
  - Organization performing the process has responsibility
- 400 Records
  - Records shall be maintained as appropriate for the currently qualified personnel, processes, and equipment of each special process.

# 9. Control of Special Processes

## III. Verification Practices

- Fabrication Planning:
  - 1) Travelers and *Quality Plan (QP)* shall be prepared to assure the fabrication activities are *accomplished following specified requirements and in the correct sequence*
  - 2) Travelers shall identify each *process step and sequence* of operation to be performed, *including specified inspection, examination and testing*

# 9. Control of Special Processes

PJT NAME: SWN(신월성) 2 & 2		M/O NO: NO13M187-19		TRV NO. NB4 711		Page 6 OF 25			
사 업 명		공사번호		트래블라번호		페이지 의			
OPER NO.	RESPON. DEPT/SEC	OPERATION DESCRIPTION	REF.DOC.NO.	HEAT/LOT RECORD NO.	FOREMAN	QC PERS	ANI /AI	CUSTOMER	REMARKS
공정 번호	담당부서 /과	작 업 내 용	적용문서번호	자재식별 기록서번호	작업반장	품질검사원	원자력/공인검사관	고 객	비 고
60	QC1	INSPECT FIT-UP AND TACK WELD	PS-SW013V1						
-A	(A04)	(JOINT NO. : 501-71A)	D-HB-21171-M05			H 3/12/06		W	
-B	(A05)	(JOINT NO. : 501-71B)				H 3/12/06		W	
-C	(A06)	(JOINT NO. : 503-71A)				H 3/12/06		W	
-D	(A07)	(JOINT NO. : 503-71B)				H 3/12/06		W	
		테크용접 및 취부검사							
		주) 피드워터 박스와 백킹바 여러군데 테크용접 여부							
70	FAB	WELD FEED WATER BOX ASS'Y	K-M-0101-829						
-A		(JOINT NO. : 501-71A)	K-F-0101-43B			H 3/12/06		ANY	ANG BDF
-B		(JOINT NO. : 501-71B)	K-TM-0101-373			H 3/12/06		ANY	RDF
-C		(JOINT NO. : 503-71A)	D-HB-21171-M05			H 3/12/06		BMH	RDF
-D		(JOINT NO. : 503-71B)				H 3/12/06		BMH	RDF
		피드워터 박스 앓셈브리 용접							
(A08)		* 에열온도는 WPS 참조							
		* 조인트 번호 구분은 다음과 같음.							
		JOINT NO. : 501-71A : 라이트 피드워터 박스							
		(ASS'Y NO. : 84-401) 쪽 백킹바							
		JOINT NO. : 501-71B : 레프트 피드워터 박스							
		(ASS'Y NO. : 84-301) 쪽 백킹바							
		JOINT NO. : 503-71A : 90° 측 핸들을 가까이있는 실 플레이트							
		JOINT NO. : 503-71B : 270° 측 핸들을 가까이있는 실 플레이트							

# 9. Control of Special Processes

## III. Verification Practices (continue)

- Special Process:
  - 1) The *responsibility of organizations including QA* shall be described *to control the qualification* of special processes, equipment and personnel
  - 2) The *QA organization* shall be involved in *qualification & inspection* activities to ensure special processes are performed satisfactorily, and the procedure shall be established to *keep records* that prove special processes are completed properly (ex. Traveler & QP)



# 9. Control of Special Processes

## III. Verification Practices (continue)

- Welding Process Specification (WPS) & Procedure Qualification Record (PQR):
  - Verifying whether welding procedure and WPS of manufacturer *conform to the requirements* of applicable codes & standards, and design requirements
  - Verifying whether *qualification tests* of WPS were *performed* under the regulatory requirements and applicable codes & standards
  - Verifying qualification, documentation, evaluation, and maintenance of WPS & PQR are *implemented* in accordance with the QA program

# 9. Control of Special Processes

## III. Verification Practices (continue)

- Welder & Welding Operator Qualification:
  - Verifying whether *measures for welding performance qualification and control of qualified welder* are established conform to the requirements of applicable codes & standards, and design requirements
  - Verifying whether the control of qualified welder is *implemented properly*

# 9. Control of Special Processes

## III. Verification Practices (continue)

- **Welding Material Control:**
  - Verifying whether welding materials conforming to the design requirements are *selected* in accordance with the requirements of SAR and applicable codes & standards
  - Verifying whether *procedures or instructions for purchasing, receiving, storing, issuing, and handling* of welding materials such as welding electrodes, filler metals, consumable inserts, fluxes and gases are established

# 9. Control of Special Processes

## IV. Cases of Deviation

- *Process control was not appropriate:*

In QA manual (QM-200, Rev.17) of Doosan, paragraph. 2.4.2 “Each step shall be performed in the numerical sequence listed on the traveler. Such *step shall be completed and accepted* prior to performing the next step.”

Contrary to this requirement step 21 of RCS Piping Traveler (TRV NO.100655490, Rev.1) was proceeded without acceptance of step 20

# 9. Control of Special Processes

## IV. Cases of Deviation (continue)

- *WPS for Valve Hardfacing was not appropriate:*

QA manual (QMP-1001, Rev.E) of Target Rock states “New *WPS (TRD 11.200, Rev.D) shall be applied* for valve hardface welding for SKN Project.” Contrary to this requirement, the welding report of valve S/N #9, #19, and #24 referred old WPS (TRD 11.200, Rev.B), which was not incorporate the revised essential parameters

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## 10. Inspection

# 10. Inspection

## I. Area of Review

- the inspection plan is established *to confirm* that the quality-affecting *tasks are performed* according to *approved* instructions, procedures and drawings
- *Personnel* performing and managing inspection of material, process and products is *qualified and certified* in accordance with criterion 2
- The inspection control measures are appropriately established the essential *inspection points* such as *Hold, Witness and Review* before starting work

# 10. Inspection

## II. Requirement 10

- 100 Basic

- Inspections required to verify conformance of an item or activity to specified requirements shall be *planned and executed*
- *Characteristics* to be inspected and *inspection methods* to be employed shall be specified and *Inspection results* shall be documented.
- *Inspection for acceptance* shall be performed by persons other than those who performed or directly supervised the work being inspected



# 10. Inspection

## II. Requirement 10 (continue)

- **200 Inspection Requirements:**

Inspection requirements and acceptance criteria shall *include specified requirements* contained in the applicable design documents or other pertinent technical documents approved *by the responsible design organization*

- **300 Inspection Hold Points:**

If mandatory inspection hold points are required beyond which work *shall not proceed without the specific consent* of the designated representative, the specific hold points shall be indicated in appropriate documents

# 10. Inspection

## II. Requirement 10 (continue)

- 400 Inspection Planning
- 401 Planning

*Characteristics* to be inspected, *methods* of inspection, and *acceptance criteria* shall be identified during the inspection planning process

- 402 Sampling

*Sampling procedures*, when used, shall be based upon standard statistical methods with engineering approval.

# 10. Inspection

## II. Requirement 10 (continue)

- **500 In-Process Inspection**

- Inspections of items *under construction or in process*
- *Inspection and/or Indirect control by monitoring.*

- **600 Final Inspection**

- 1) Resolution of *nonconformances*
- 2) Inspection requirements: characteristics such as *completeness, markings, calibration, adjustments, protection from damage*, etc.
- 3) Modification, Repairs, or Replacement
- 4) Acceptance: approved *by authorized personnel*

# 10. Inspection

## II. Requirement 10 (continue)

- **700 Inspection during Operation**

Periodic inspection of surveillances of SSC shall be planned and executed

- **800 Records**

(a) item inspected, (b) date of inspection, (c) inspector, (d) type of observation, (e) results or acceptability, (f) reference to information on action taken in connection with nonconformance

# 10. Inspection

## III. Verification Practices

- Inspection Plan:
  - 1) Inspection plan, QP or ITP (Inspection & Test Plan), shall be supported by the *inspection procedure* suitable for their characteristics of activities such as *Receiving Inspection, In-Process Inspection, Final Inspection*, etc.
  - 2) Inspection plan shall have a space in which the objective evidence of inspection can be *recorded*
  - 3) *Inspection service contractor* shall appropriately establish the inspection plan and/or procedures

# 10. Inspection

DOOSAN

## QUALITY PLAN

QP NO.	QP-SW1819T7
REV. NO.	1
PAGE	4 OF 12

SEQ. NO.	OPERATION DESCRIPTION	APPLICABLE DOCUMENT NO.	REV. NO.	INSPECTION RESULT			REPORT NO.	REMARK
				DOOSAN	KNSP/KOGEN			
	<div>GROUP A</div> <div>LOWER VESSEL ASS'Y</div> <div>D-HB-21141-M03, D-HB-21171-M05, W06</div>							
A01	VERIFICATION OF MATERIAL			H		W		
A02	REVIEW OF WELDER QUALIFICATION & WELDING PROCEDURE QUALIFICATION RECORD			H		W		
	< FEED WATER BOX ASS'Y >							
A03	FIT-UP FEED WATER BOX ASS'Y - JOINT NO.: 501-71A,B & 503-71A,B	K-M-0101-829 K-F-0101-438 K-TM-0101-373						
A04	FIT-UP INSPECTION OF FEED WATER BOX ASS'Y - JOINT NO.: 501-71A	PS-SW013V1		H		W		
A05	- JOINT NO.: 501-71B			H		W		
A06	- JOINT NO.: 503-71A			H		W		
A07	- JOINT NO.: 503-71B			H		W		
A08	WELD FEED WATER BOX ASS'Y - JOINT NO.: 501-71A,B & 503-71A,B	K-M-0101-829 K-F-0101-438 K-TM-0101-373						
A09	VISUAL & DIMENSIONAL INSPECTION - JOINT NO.: 501-71A	PS-SW013V1		H		W		
A10	- JOINT NO.: 501-71B			H		W		

NOTES

(760-건설-0506 '85.6.1)

두산중공업

A4-210x297(M)



# 10. Inspection

## IV. Cases of Deviation

- Inspector's sign disagree:

Inspector's sign in *Dimensional Inspection Report* (SWN2-CSP-SF-001) of Hyosung Goodsprings, Containment Spray Pump supplier, was disagree with the inspector's sign in the same step of *Traveler* (No. SW1-CSP-TR01, Rev.1) and *QP* (No. SWN 203-001, Rev.1)

# 10. Inspection

## IV. Cases of Deviation (continue)

- Inspection Hold Point was not specified:

In the process control procedure (PP-09-01, Rev.5) of Westinghouse , inspection requirement states “Inspector shall indicate the Witness Point and Hold Point with the sign ‘W’ and ‘H’ respectively in the Production Order in order to perform In-Process Inspection.”

Contrary to this requirement, all inspection steps in Production Order are sign with ‘X’ *without distinction between Witness Point and Hold Point*



Always we keep watching  
our Atomic Power



Thank You



한국원자력안전기술원  
KOREA INSTITUTE OF NUCLEAR SAFETY