



Doosan Heavy Industries & Construction

Nuclear Businesses

Sept 10, 2009



Session 3
NEA/MDEP Conference on the New Reactor Design Activities

Sang Jin, Kim sangjinkim@doosan.com
Doosan Heavy Industries and Construction Co., Ltd.

Fully Integrated Single Site Manufacturing Facility

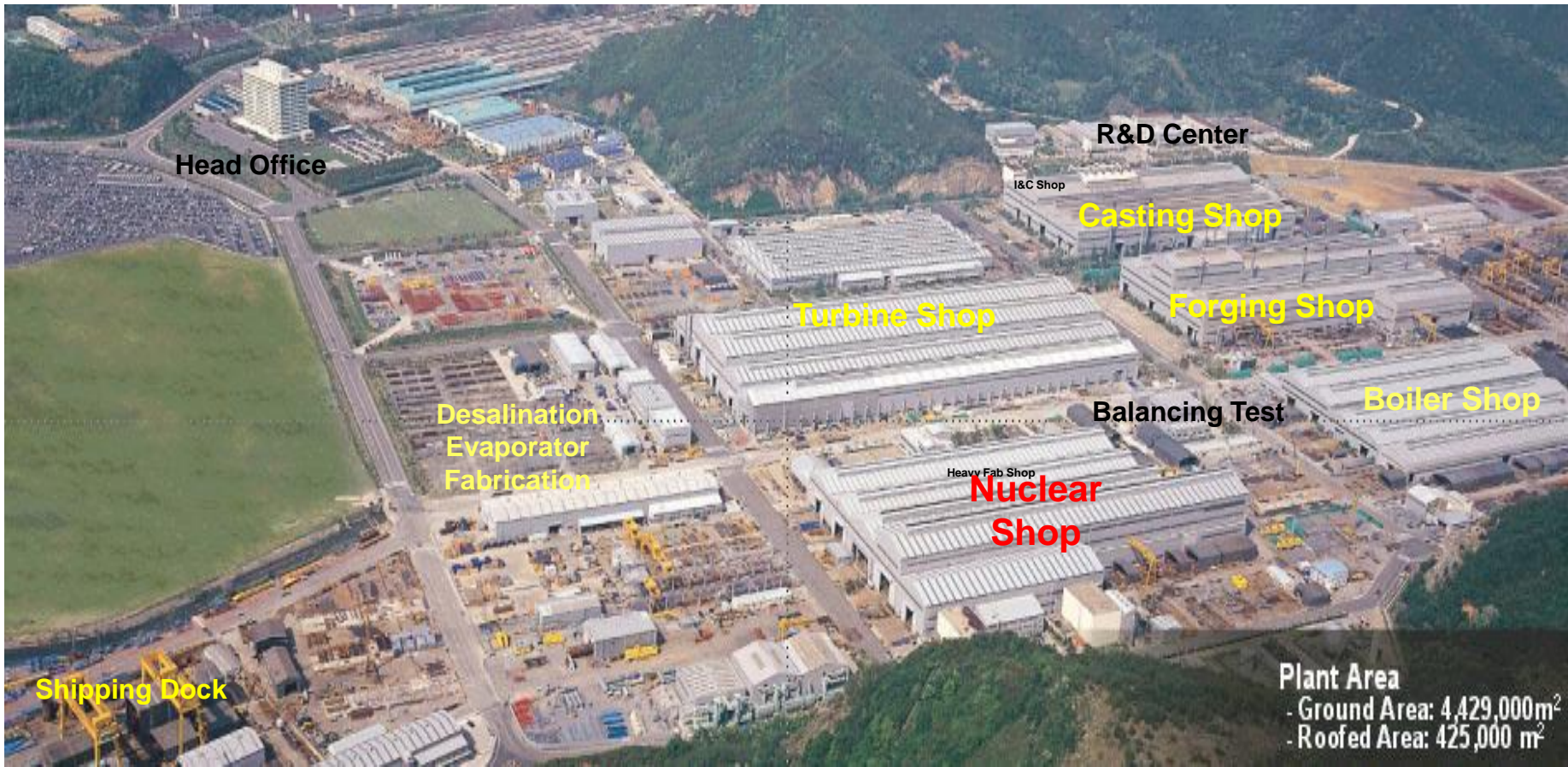
Casting & Heavy Forging

Heavy Machining

Fabrication & Assembly

Test

Shipment



Major Nuclear Products (PWR)

◆ Nuclear Steam Supply System

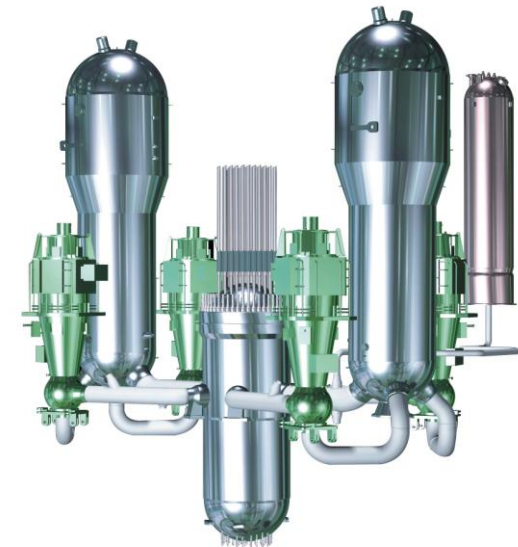
- Reactor Vessel
- Reactor Internals
- Control Element Drive Mechanism
- Integrated Head Assembly
- Steam Generator
- Pressurizer
- Primary Piping
- Fuel Handling System Equipment

◆ Balance Of Plant

- Heat Exchangers
- Pressure Vessels & Tanks
- Gas Stripper
- Boric Acid Concentrator
- Moisture Separator Reheater

◆ Fuel Storage

- New and Spent Fuel Racks
- Spent Fuel Transportation Cask / Canister



NSSS of OPR (Optimized Power Reactor)



Spent Fuel Transportation Cask/Canister for Kori site

Major Nuclear Products (PHWR)

◆ Major Products for CANDU plants

- Calandria
- Feeder/Header
- Steam Generator
- Pressurizer
- Degasser Condenser
- Major Heat Exchangers
- Tanks
- Fuelling Machine Bridge



Shipping of Wolsong #4 Calandria at DOOSAN Shop

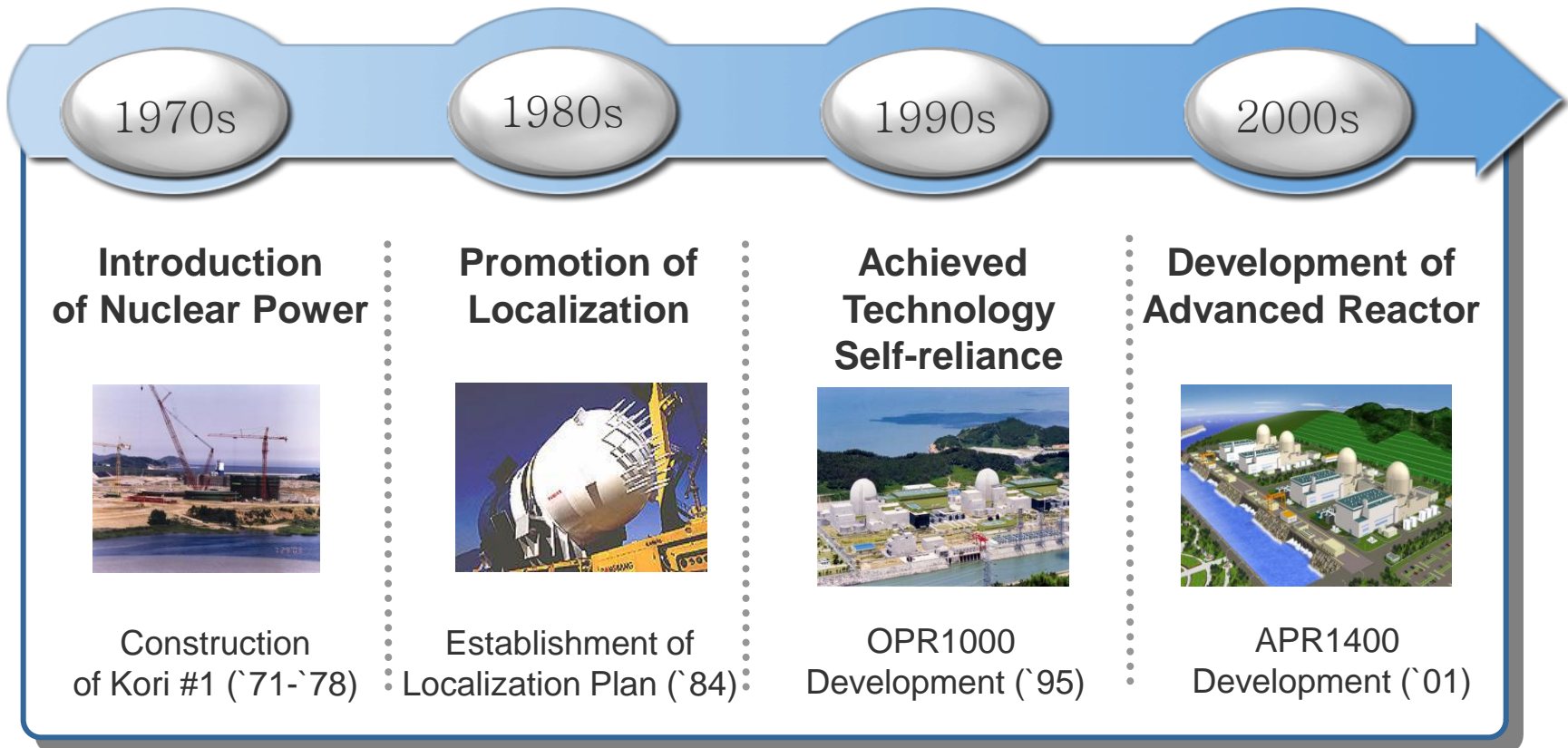


Fabrication of Feeder/Header Assembly

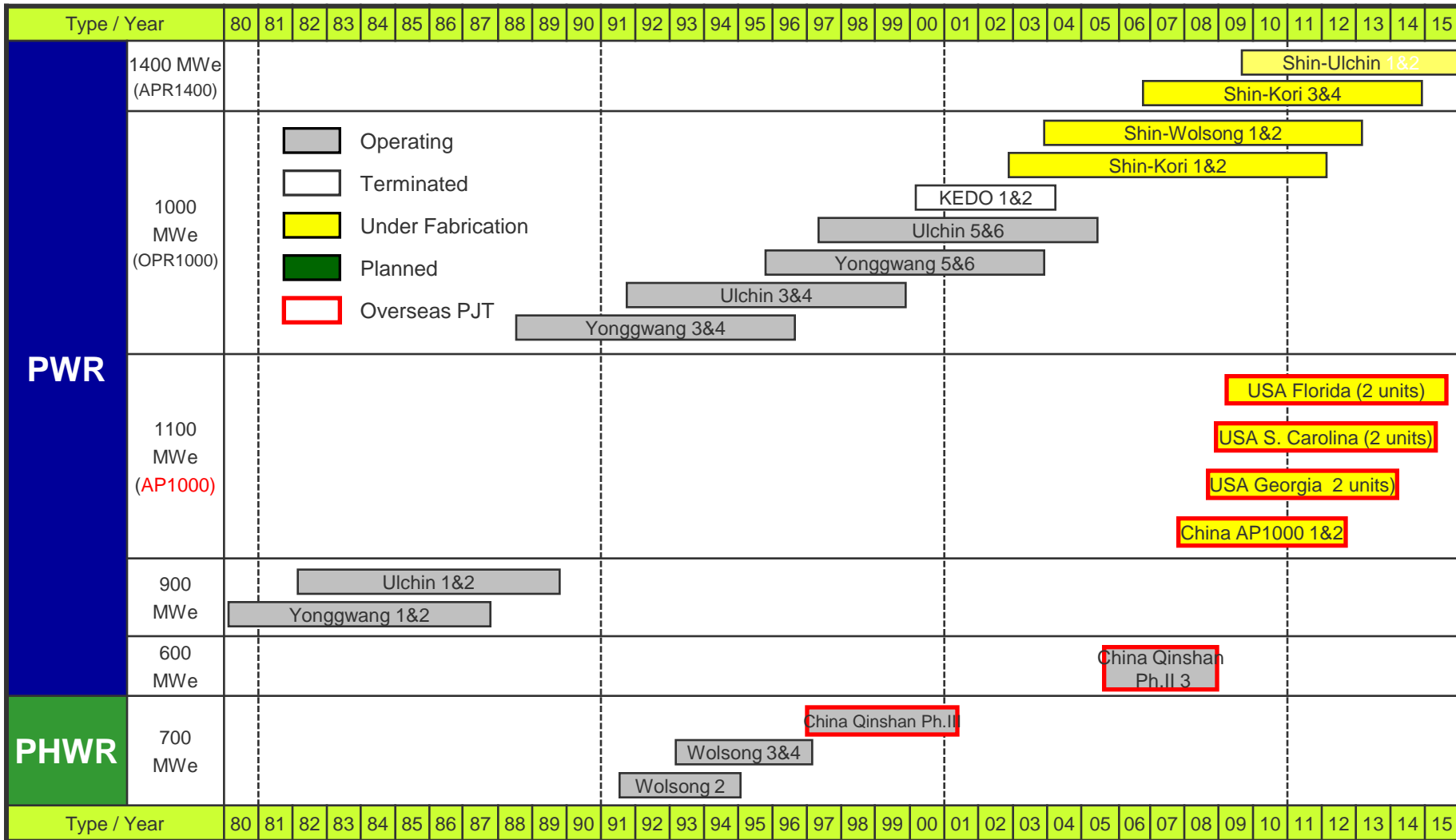
Development of Korea Nuclear Technology

Over 30 years experience in nuclear power, Korea has accomplished accumulated proven and state-of-the-art technology.

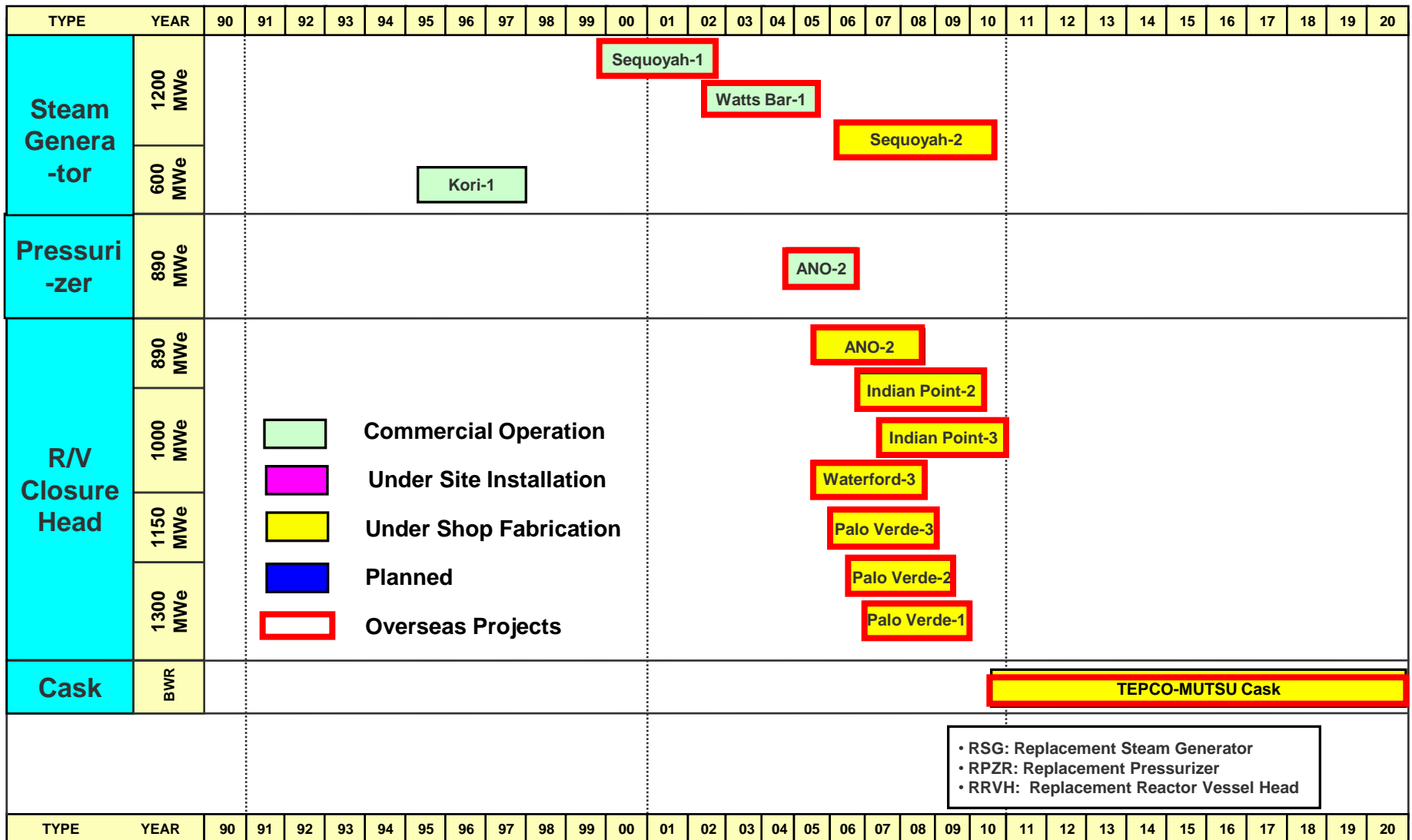
- DOOSAN completed supplying components of 8 units of new NPP in Korea
- DOOSAN is fabricating components of 6 units of new NPP in Korea
- DOOSAN has supplied components for new NPP and replacements to China and U.S.A.



New Nuclear Power Plant Projects



Nuclear Components Replacement Projects



Major Experiences of Supplying Nuclear Components

**Qinshan Phase III #1&2
Steam Generator**



**Sequoyah #1
Steam Generator**



**Watts Bar #1
Steam Generator**



**Arkansas Nuclear One #2
Pressurizer**



**Ulchin #5
Reactor Vessel**



**Qinshan Phase II #3
Reactor Vessel**



AP1000 Components being made in DOOSAN

DOOSAN had received Orders to supply **Reactor Vessels, Steam Generators, Reactor Vessel Internals** and other components of AP1000 in China and USA



Summary

- **DOOSAN recognizes its role in the success of new US nuclear plants is to supply high quality products and on time delivery.**
- **DOOSAN is investing to ensure that we can meet all of the customer value in US new plant projects by**
 - **Maintaining high manufacturing capabilities**
 - **Well qualified and experienced employees**
 - **Reliable and quality supply chain**
 - **Cooperative support to & communication with customer.**



2009 NEA/MDEP Conference Topics

- **How new reactor design review activities is managed in DOOSAN**
- **Expectations to the Future MDEP Activities**

NEA/MDEP Expectations

- **Codes and Standards Working Group (CSWG) Activities**
 - Evaluation of the similarities and differences among Codes & Standards are underway
 - Things are different...Codes and Standards harmonization is difficult
 - 1st Step : Quality Assurance Criteria be harmonized
 - 2nd Step : Design and Fabrication Codes for pressure boundary be reconciled

- **Vendor Inspection Cooperation Working Group (VICWG) Activities**
 - New Reactor vendor inspections is being reinforced
 - Many components be manufactured Outside of Country
 - Global Supply Chain oversight activities be cooperated International Regulators
 - Joint vendor inspection by Regulators be Needed
[Examples: NUPIC and NIAC]
 - But, in any case, International Regulators' vendor inspection Policy, Requirements, Program and Interests are different

DOOSAN, as AP1000 major component supplier

To introduce Design Review working process with Westinghouse for AP1000

Westinghouse as a design company and DOOSAN as a component manufacturer, we do keeping strong business partnership in various projects.

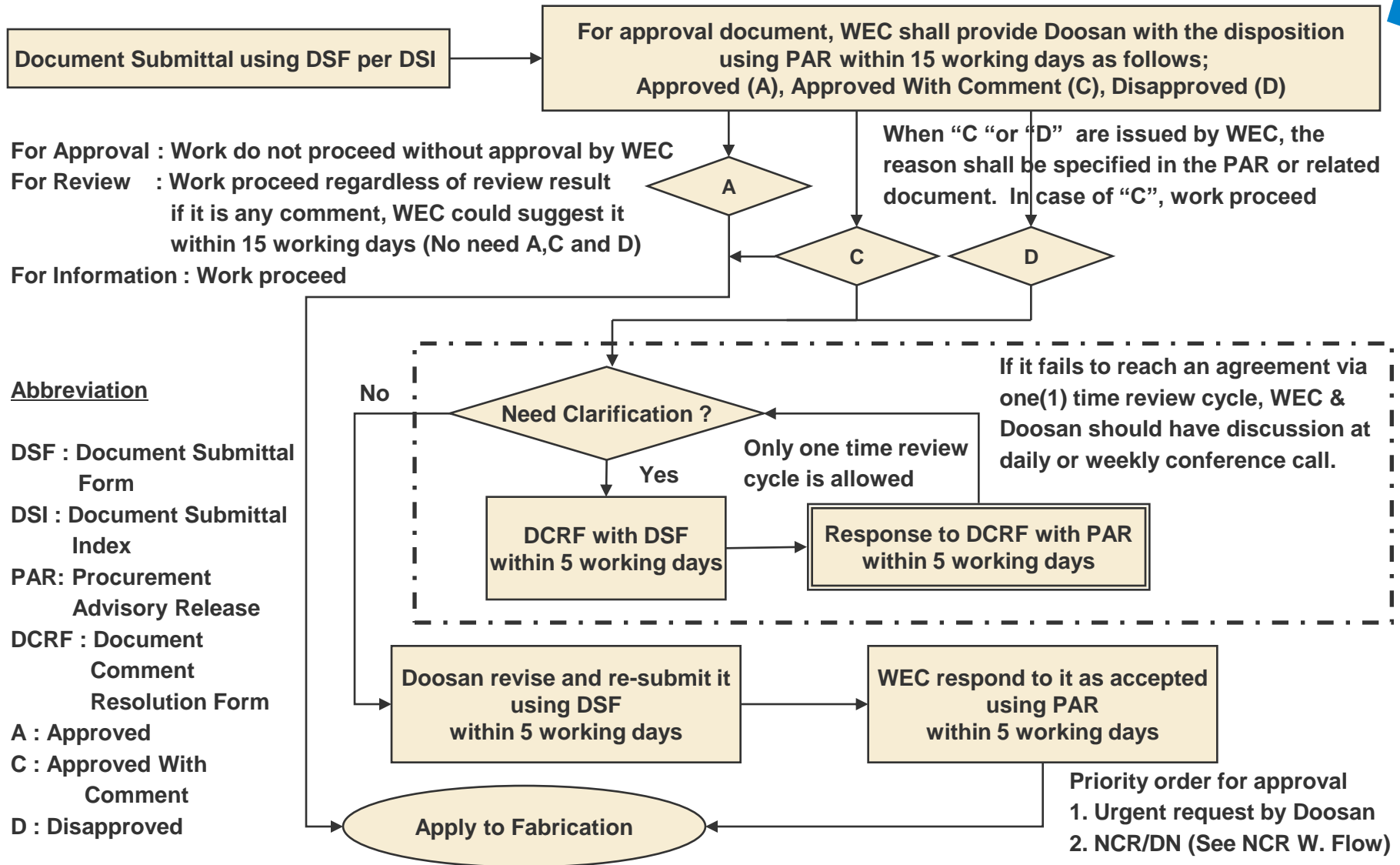
WEC develop design drawings and various design requirements and transmit to DOOSAN through WEC's e-room. And DOOSAN review WEC requirements and make manufacturing drawings, MPS (material purchase specification), QP (quality plan), WPS (welding process specification) and detail manufacturing procedures.

DOOSAN submits all manufacturing drawings and documents to WEC for their review.

DOOSAN has 30years manufacturing experiences and engineering capability. So, **when we review WEC design documents, DOOSAN would like to add our knowledge and experiences to their AP1000 design. And comparing our previous experience, the differences and unique things notified our relevant team and for some cases we discuss with WEC to find best way to manufacturing.**

DOOSAN well understands that AP1000 is the most outstanding plant among GEN III+ types. Even though our contribution is too small for AP1000 design, DOOSAN believes that our experiences can make AP1000 more perfect one.

Design Document Review or Approval Work-Flow



Communication and Response

- **Geographical distances between Korea manufacturing facilities, designers (Westinghouse), utility customers and US construction sites**

DOOSAN maintains SDMS (Site Document Management System) for customers in the geographical distances.

- Submits all documents for customer approval and receives documents from customers.

Main window of SDMS

The screenshot shows the main window of the SDMS (Site Document Management System). It features a search bar at the top with fields for 'Written Date' (2006.04.01 ~ 2006.04.10), 'Document No.', 'Title', 'Path', and 'Customer/Vendor Name'. Below the search bar is a table of documents with columns for 'Main/Last/Att.', 'Document No.', 'Sheet No.', 'Rev No.', 'Title', and 'Path'. The table contains several rows of document information, including 'test', 'drm test', and 'site document'. At the bottom of the window, there are navigation buttons for 'Submit', 'Move', 'Excel', and 'Print'.

9	10	11	12	13	14
Main/Last/Att.	Document No.	Sheet No.	Rev No.	Title	Path
M F A	ZD000-0026	-	00	test	DOOSAN \Received Documents\
M F A	ZD000-0025	-	00	drm test	DOOSAN \Received Documents\
M F	ZD000-0022	-	00	site document	DOOSAN \Received Documents\
M F	ZD000-0022	-	00	site document	Doosan Site \Received Documents\
M F A	ZD000-0023	-	00	drm test	DOOSAN \FOLDER1\
M F	ZD000-0022	-	00	site document	DOOSAN \FOLDER1\
M F	ZD000-0021	-	00	temp box1	DOOSAN \FOLDER1\

What for use

- Document registration, transmittal and storage
- Communication tools (review and approval)

How to use

- Easy to access on web-site and log-in
- Good reputation from customer

What to achieve

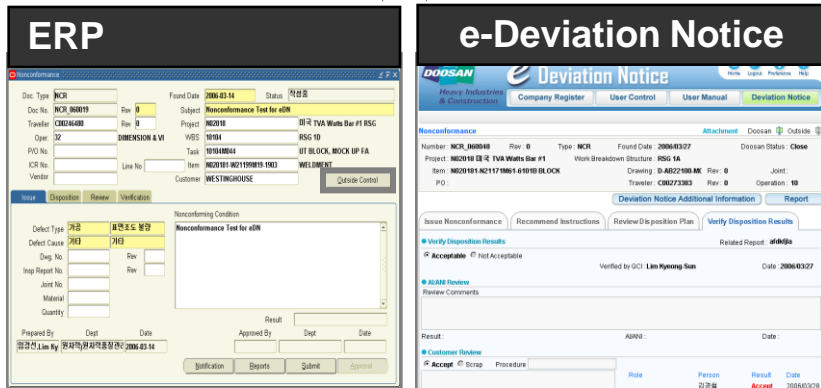
- Sharing information in real time
- Safe document storage

Communication and Response

Doosan also maintains e-Deviation Notice System to share information with customers.

- Whole processes such as NCR notification, review, disposition and approval are executed and monitored.

Communication Channel with Customer



** : Optional Process

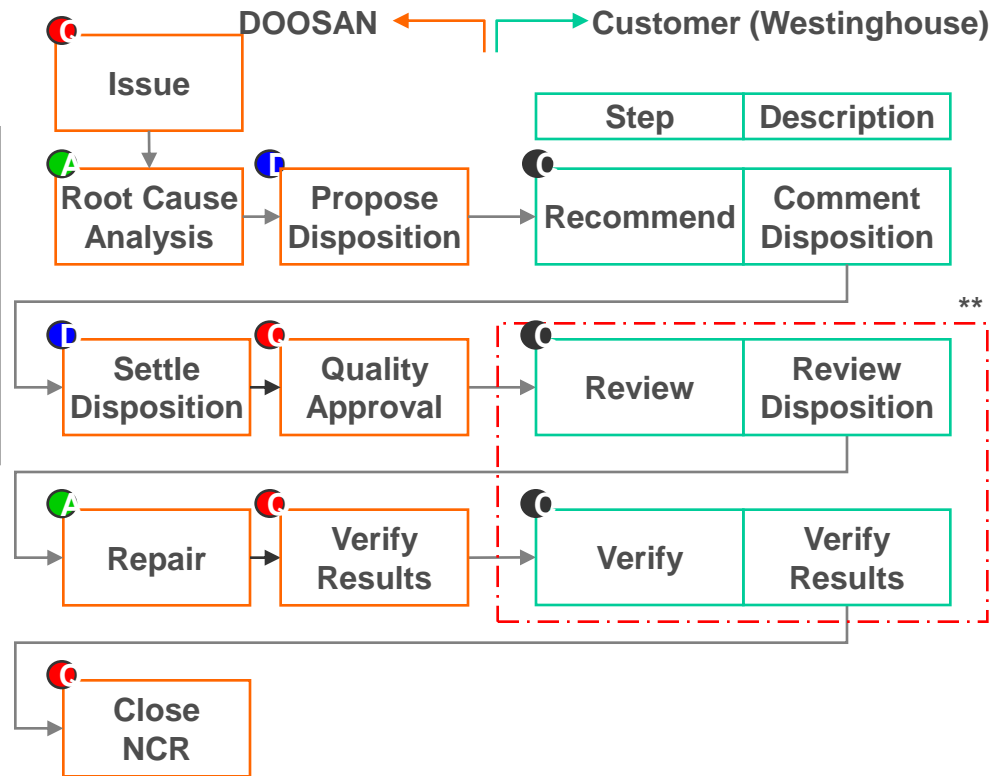
Q : Quality

D : Design/Engineering

A : Applicable Department

C : Customer/ANI

- Customer registration
- User Control
- Monitor Nonconformance
- Review Disposition





Your Reliable Partner in Nuclear Power

Thank you

