Standardization of the WPS and Development of the Welding Process Management System for Nuclear Power Plants

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1. Introduction

The purpose of this study is to integrate existing WPS(welding procedure specification) & PQR(procedure qualification records) which are kept by every branch office respectively and to develop a specialized program that will assist in the creation of WPS and PQR in accordance with the ASME Sec. IX, III, B31.1, etc. These research results make possible not only to ensure structural integrity by applying WPS & PQR correctly but also to cut down on expenses by managing the welding process efficiently. Moreover, as the specialized program will be linked with ERP system between KHNP and KPS, an administration action of welding process will be dealt with on-line. The backgrounds of this study are as follows;

- Need to apply WPS correctly and promptly
- Need to cut down on expenses due to overlapping development WPS
- Need to manage welding resources efficiently
- Need to standardize welding QA(quality assurance) documents
- Need to improve efficiency of administrative welding process

2. Method and Results

2.1 Integration and standardization of existing WPS & PQR

A number of WPS have been doubly developed by each branch office because each branch office has created WPS only for their office, which has caused unnecessary expenses and time. Therefore, to save expenses and time, it is necessary to make integration and standardization of WPS. Figure 1 illustrates a flow chart for the developing standard WPS.

The process of making a standard WPS has been made by reviewing the code requirements for the base metal, thickness range, welding process, joint, filler metal, preheat, interpass temperature, and post weld heat treatment. As a result of similarity analysis for existing WPS, existing 463 WPS of branch office can be standardized and integrated to 48 standard WPS for common use. Table 1 shows the present state of WPS and table 2 illustrates the list of standard WPS as a example.

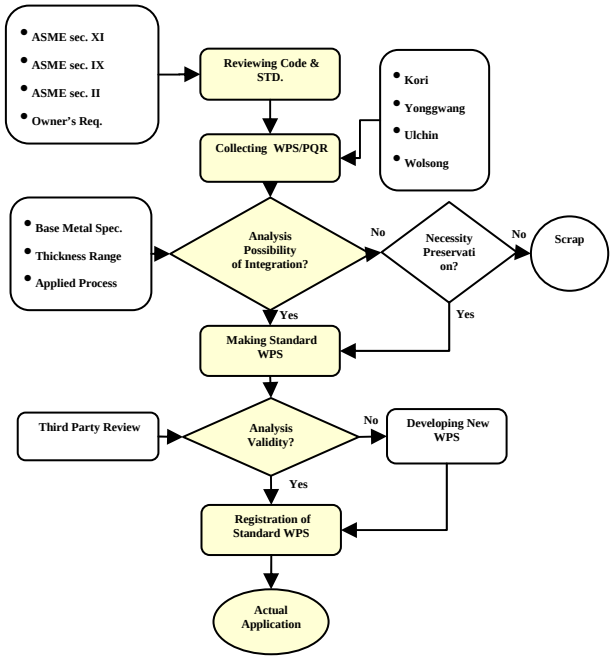

Fig. 1. A Flow Chart for the Developing Standard WPS

Table 1. The Present State of WPS

	K1	K2	Y1,2,3	U1,2,3	W1	W2	Total
As-Is	59	135	90	53	53	73	463
To-Be	48 Standard WPS						48

Table 2. The List of Standard WPS(Sample)

P-No	Process	Thickness	WPS No.	Filler Metal	Joint	Preheat /Interpass	PWHT
P1+P1	GT	1.6~11	WP-07-001	SFA5.18/ ER70S-2(6)	Groove	10/260	N/A
		4.8~38	WP-07-014	SFA5.18/ ER70S-2(6)	Groove	60,120/ 260	N/A
	SM	4.8~38	WP-07-003	SFA5.1/E 7016(18)	Groove	60,120/ 260	N/A
		4.8~25	WP-07-006	SFA5.1/E 6013	Groove	10/180	N/A

2.2 Development of a integrated WPS & PQR management system

Integrated WPS & PQR management system has been developed to create WPS correctly in accordance with the ASME Sec. IX and to manage welding resources and welding process efficiently. And also, the developed system will be linked with ERP system between KHNP and KPS, which can make possible an efficient administration action of welding process by providing on-line processing. Integrated WPS & PQR management system has been developed using Flex and JAVA as a web development language to operate on the website. In case of creating WPS & PQR, because the numerous relevant data need to interact each other, there is much limitation to realize effective programming with JAVA. In order to make up JAVA's shortcoming, Web 2.0, Flex, applied to develop welding management system. Figure 2 shows a lay-out of the WPS & PQR management system, and figure 3 shows the main screen of the system.

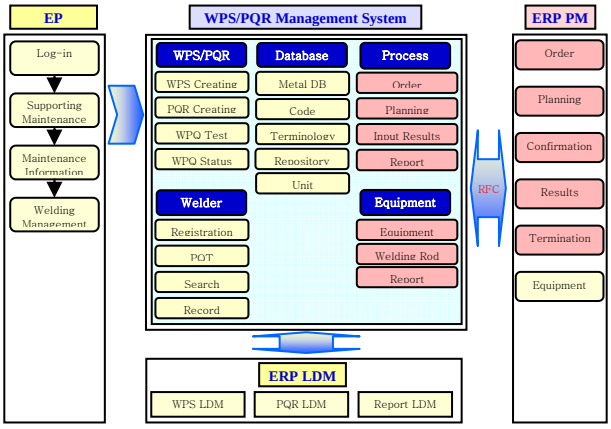

Fig. 2. Lay-out the WPS & PQR Management System

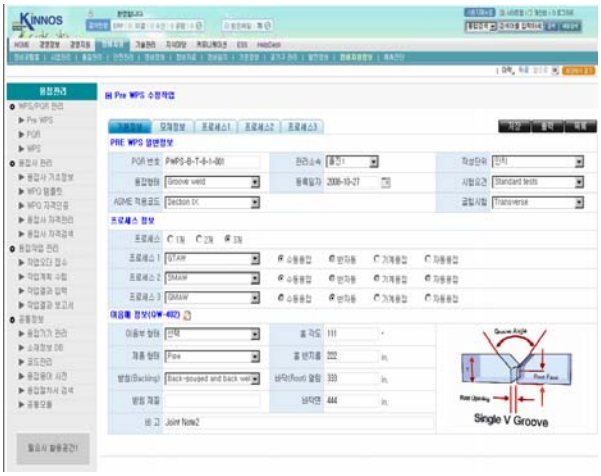

Fig. 3. Main Screen of the WPS & PQR Management System

3. Conclusions

- Existing 463 WPS of branch offices have been integrated to 48 standard WPS.
- It is possible to save expenses and time to create correct WPS by using a specialized program.
- Administration process for welding between KHNP and KPS will be promoted efficiently by linking with ERP system.

REFERENCES

[1] ASME Code Section Ⅸ, 2007 Ed.
[2] ASME Code Section III 2007 Ed.
[3] ASME B31.1, 2008Ed..