

Establishment of an Integrated Database System for Nuclear Materials

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1. Introduction

As a part of a project of high temperature materials characterization and advanced materials development, we are establishing integrated database systems for activation of R&D nuclear materials. The database constructions using the raw data produced from research experiment can increase the applications of final results. Also, we can easily obtain the basic and raw data from database system when we have plan the new and creative experiment and can produce high quality results by compare the previous data. In this present, the DBs of seven kinds of materials property were developed by internet method using Oracle 9i and JSP (Java Server Pages) tools.

2. Methods and Results

In this section some of the technical results used to format the database formations are described. The formats of data sheets were composed to formulate the experimental results, and to accept the approval of the project manager. The data sheets consist of material information, specimen information, tests condition and results sessions. These databases are operating on the bases of user-friendly WWW systems, and DBs of materials properties are accessible through the home page of Div. of Nuclear Materials Tech & Develop. of KAERI (<http://matdb.kaeri.re.kr>).

2.1 Development of impact and fatigue properties DB

Analysis of impact and fatigue experimental data is shown as a sheet formulation in Fig.1, for three part of information of materials, specimens and conditions & results that have been obtained as approval experiments.

Tensile test data sheet		Doc. No. : KAERFTEN-011101
2015.05.20	10	10
Title : Tensile properties of SA508-Gr.3 steel for UCN-4 RPV		
Key words for		
1. SA508-Gr.3	2. Pressure Vessel	
3. Tensile Specimen	4. UCN-4	
5. Tensile	6. WELD	
Case	2001. B. 3.1	
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Fig. 1. Example of standard data-sheet

It is difficult to obtain the general corrosion data with one data sheet. So, analysis of corrosion experimental data is consisting of four part of information of materials, specimens, conditions and data-sheet. Analysis and design of application program was composed FHD (Function Hierarchy Diagram) (shows in Fig. 2)

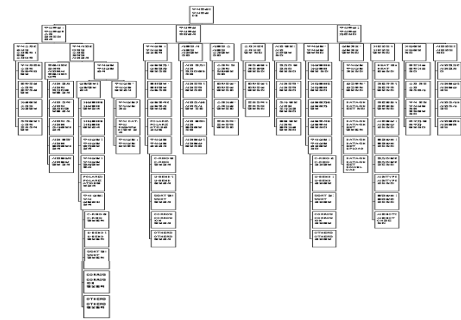


Fig. 2. FHD of the material corrosion DB system.

2.3 Establishment of material creep properties DB

The tensile property DBs analysis method was also used for analysis of creep DBs. The ERD (Entity Relationship Diagram) was applied for analysis and design of DBs of creep and can be obtained the source code for DBs system formation. Fig. 3. shows the ERD.

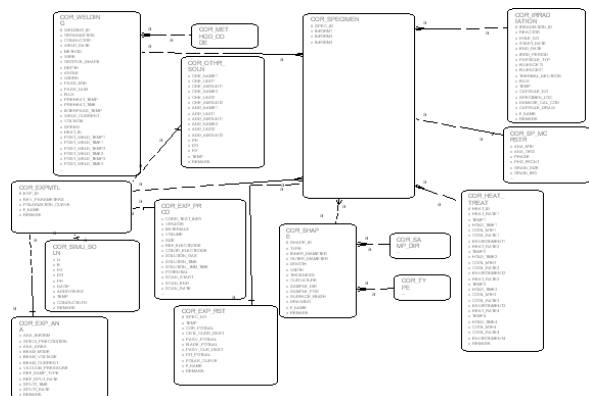


Fig. 3. ERD (Entity Relationship Diagram) of the material creep DB system.

2.2 Establishment of material corrosion properties DB

2.4 Establishment of the database management system and application program

The database management system is programmed using Oracle 9iAS (Internet Application Server) and application program is made of Java, JSP and PL/SQL. Fig. 4. shows the web page of material property DBs.

Material No.	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	...
01	210	355	22	...
02	210	455	N/A	...
03	210	505	30	...
04	210	555	35	...
05	210	605	40	...
06	210	655	45	...
07	210	705	50	...
08	210	755	55	...
09	210	805	60	...
10	210	855	65	...
11	210	905	70	...
12	210	955	75	...
13	210	1005	80	...
14	210	1055	85	...
15	210	1105	90	...
16	210	1155	95	...
17	210	1205	100	...
18	210	1255	105	...
19	210	1305	110	...
20	210	1355	115	...
21	210	1405	120	...
22	210	1455	125	...
23	210	1505	130	...
24	210	1555	135	...
25	210	1605	140	...
26	210	1655	145	...
27	210	1705	150	...
28	210	1755	155	...
29	210	1805	160	...
30	210	1855	165	...
31	210	1905	170	...
32	210	1955	175	...
33	210	2005	180	...
34	210	2055	185	...
35	210	2105	190	...
36	210	2155	195	...
37	210	2205	200	...
38	210	2255	205	...
39	210	2305	210	...
40	210	2355	215	...
41	210	2405	220	...
42	210	2455	225	...
43	210	2505	230	...
44	210	2555	235	...
45	210	2605	240	...
46	210	2655	245	...
47	210	2705	250	...
48	210	2755	255	...
49	210	2805	260	...
50	210	2855	265	...
51	210	2905	270	...
52	210	2955	275	...
53	210	3005	280	...
54	210	3055	285	...
55	210	3105	290	...
56	210	3155	295	...
57	210	3205	300	...
58	210	3255	305	...
59	210	3305	310	...
60	210	3355	315	...
61	210	3405	320	...
62	210	3455	325	...
63	210	3505	330	...
64	210	3555	335	...
65	210	3605	340	...
66	210	3655	345	...
67	210	3705	350	...
68	210	3755	355	...
69	210	3805	360	...
70	210	3855	365	...
71	210	3905	370	...
72	210	3955	375	...
73	210	4005	380	...
74	210	4055	385	...
75	210	4105	390	...
76	210	4155	395	...
77	210	4205	400	...
78	210	4255	405	...
79	210	4305	410	...
80	210	4355	415	...
81	210	4405	420	...
82	210	4455	425	...
83	210	4505	430	...
84	210	4555	435	...
85	210	4605	440	...
86	210	4655	445	...
87	210	4705	450	...
88	210	4755	455	...
89	210	4805	460	...
90	210	4855	465	...
91	210	4905	470	...
92	210	4955	475	...
93	210	5005	480	...
94	210	5055	485	...
95	210	5105	490	...
96	210	5155	495	...
97	210	5205	500	...
98	210	5255	505	...
99	210	5305	510	...
100	210	5355	515	...

Fig. 4. The web page of material property DBs.

3. Conclusion

The results of this project are suggesting the management and establishment of information and detailed property result data of materials which have caused failures of structures and components in Nuclear Power Plants. The material researches and technologies for severe conditions are able to apply developing the advanced materials for Fusion and GEN-IV systems.

In order to establish the materials database, the formats of general datasheets were fixed to manage the experimental data with effectiveness and reliability. The database operating systems for data input/output were designed and programmed to open through an internet site. The material database systems have a significant role for the knowledge-base national property.

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