# Design of a Pyroprocess Engineering Project Management

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## 1. Introduction

KAERI has been constructing the PRIDE (PyRoprocess Integrated Demonstration Facility) by using natural uranium in order to establish the ESPF (Engineering Scale Pyroprocess Facility) since 2007.

The pyroprocess system that has been carried out through research & development and design technology simultaneously made it difficult to interface between projects. Especially since the pyroprocess has to operate the devices remotely under the proper circumstances in the radiation control zone, the design of the facility and devices varies considerably from other than general facilities.

There is no way to manage a budget and a schedule due to unexpected changes in design under the current situation. To cope with these problems, a system that can guarantee a technical traceability from the higher level to a process design of a subsystem should be established in order to archive a pyroprocess facility that deal with spent fuel. In addition, it is also necessary to establish a pyroprocess management system that satisfies the design requirement of pyroprocess facilities and verification of the traceability of pyroprocess technology through the overall management of costs and schedule.

System engineering has been increasing into huge complex systems such as constellation program of NASA[1] and the tokamak design of ITER[2].

System engineering and requirement management are the initials step in a Pyroprocess development cycle. Gathering requirements and managing requirements for Pyropocess are key factors to successful project management. The main reason many projects have failed is because of poor requirements.

The first phase of establishing a pyroprocess engineering project management, process a computerized environment was designed in order to create traceability of pyroprocess technology and database management.

## 2. Methods and Results

### *2.1 Role of Requirement Engineering for PRIDE*

Requirements engineering is a discipline that applies from the start of the system development lifecycle and to act as means of communication between projects.

The relationship between requirements and the lifecycle of pyroprocess system development in requirements engineering is represented in Fig. 1.

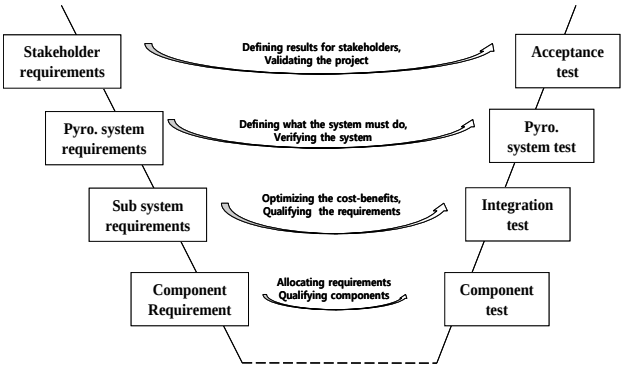


Fig. 1. Requirements engineering in hierarchical structure

### *2.2 Derivation of PRIDE System Requirements*

Based on a pyroprocess design architecture, component requirements related to the pyroprocess system were derived. Pyroprocess system consists of utilities, facilities that include safety design of structures and radiation safety design, and supporting devices that need operation and maintenance. A pyroprocess facility must satisfy legal requirements related to safety because it is treating spent fuel. The following are representative legal elements related to facility safety.

O For Safety
- Title 10CFR (Nuclear Safety Management)
- Subpart B (Safety Basis Requirements)
- DOE Order 420.1B (Facility Safety)
- DOE-STD-1189-2006 (Integration of Safety into the Design Process)
- DOE Order 413.3 Project Management

O For Safeguards and Security
- 2005 DOE Design Basis

The representative requirements of the derived pyroprocess system depict in PBS (Product Breakdown Structure)(Fig. 2)

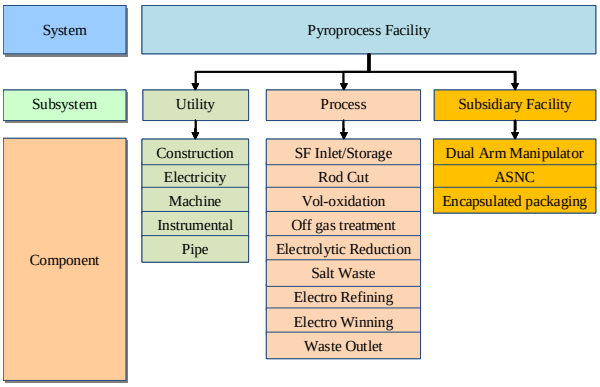


Fig. 2. Product Breakdown Structure of Pyroprocess System

### *2.3 Definition of Internal Interface*

An internal interface creates functionalities for the pyroprocess system and defines an interface between subsystems and components

This diagram provides the means of showing the physical structure of some or all of a system at a particular level.
The PAD (Fig. 3) shows the physical flows between the pyroprocess system components at the level of interest.

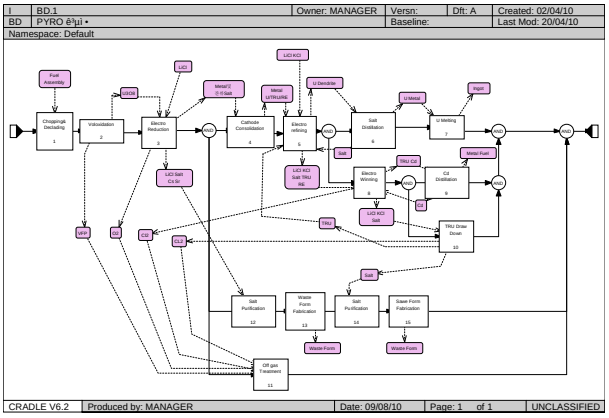


Fig. 3. Pyroprocess system interface of the system modeling

### *2.4 System Environment*

The computerized environment for managing a pyroprocess engineering integrated project was created to provide the technical consolidation between the pyroprocess and other projects, a collaboration that shares the pyroprocess information, consistent communication, and the visibility of the R&D status which is also necessary. Fig. 4 shows a schematic diagram for the pyroprocess system.

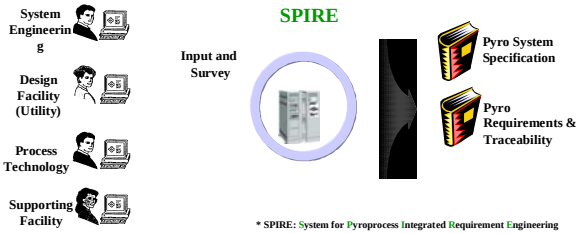


Fig. 4. Schematic diagram for managing pyprocess system

## 3. Conclusions

To establish connection-based technology between pyroprocess and a nuclear fuel cycle, pyroprocess engineering project management was designed by using requirement engineering and system engineering. A requirement element for pyroprocess system was created based on the role of requirement engineering. To define the collaboration between projects and requirements, an internal interface was derived. Pyroprocess project management technology will be overseen through confirmation in real time for the purpose of decision-making and objective evaluations.

## Acknowledgement

This work was supported by the Nuclear Research & Development Program of the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science & Technology (MEST). (Grant code: 2009-0062309)

## REFERENCES

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[2] S. Chiocchio, E. Martin, P. Barabachi, Hans Werner Bartels, System Engineering and Configuration Management in ITER, Fusion Engineering and Design 82 (2007) 548-554.