Skill Management for accelerator operation and maintenance.

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It seems to be different, but there is a lot of common

Such as · · ·
✔ It is assembled with many parts or components.
✔ Many people are cooperate and work together.
✔ Various skills are required.
Objective

- Introduce our Skill Management Program
- Discuss with other operator experience
Outline

• Background
  • Our facility
  • The supporting partner

• Introduction
  • What is the SMP, skill management program,
  • Schematic design of the QMS

• Overview (Skill Management Program)
  • How can we use the SMP?
  • What dose SMP give?
  • The SMP for Aircraft Maintenance
  • About our SMP
  • How do you measure a skill?
  • Sample of the Skill Map and the Skill Matrix
  • Conclusion and focus of discussion
Background
Our Facility

Heavy Ion Medical Accelerator in Chiba, HIMAC.

- The size of the building is 23,000 m²
- The facility was completed in 1993.
- The clinical trials were started in 1994.
- In the present,
  - Using for therapy and research
  - About 600 patients/ 6,000 hours operation
  - Periodic maintenance is twice a year
The supporting partner

AEC, Accelerator Engineering Corporation, is our partner. Approximately 100 employees are supporting the following task.

- Operation and maintenance for the HIMAC
- Treatment planning
- Development of the product
- Going to install the Skill Management Program
Introduction
What is the SMP?

The SMP, Skill Management Program, is a part of the QMS, Quality Management System.

What is a QMS?

Similar to ISO 9001

But, more flexible design

Based on Aircraft Maintenance
Schematic design of the QMS

Risk Management Program
(Evaluate a risk)

Information of an analysis data

Reliability Monitoring Program
(Data analysis)

Improve the program

Skill Management Program

Tool & Equipment Control Program

Part & Stock Control Program

Operation and Maintenance Task
(Obtain a data, such as failure mode, defective part etc.,)

Any data

Production control

Modification

Repair or Periodic maintenance

Revision a document

Designer (NIRS)

Manufacture

Technical information

Technical Order

Documentation

Instruction Manual

Work Sheet

Procedure manual

Reporting

Modify or Periodic maintenance

Production control

Any data

Manufacturer
Overview
Skill Management Program (SMP)
How can we use the SMP?

Hi

Motivate

Delegate

Instruct

Educate

Ability – will - Competence

Willingness - will - Motivation

Will
Skill
Management

1
2
3
4
What dose the SMP give?

For management:
- Easy job allocation?
- Performance improve?
- Disclosing every skill
- Easy planning for training
- Fostering of skilled person

For individual:
- I know my level.
- Clear aim for skill-up
- Creating professionalism
The SMP for aircraft maintenance

**Typical case of Engine Overhaul**

<table>
<thead>
<tr>
<th>Duty &amp; Responsibility</th>
<th>1st class Mechanic</th>
<th>2nd class Mechanic</th>
<th>Basic class Mechanic</th>
<th>1st class Mechanic</th>
<th>Inspector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Step</td>
<td></td>
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<tr>
<td>Incoming inspection</td>
<td></td>
<td>Disassembly</td>
<td>Cleaning</td>
<td>Assembly</td>
<td>Performance test / Return to service</td>
</tr>
</tbody>
</table>
About our SMP

A skill is separated to 6 block, called skill partition. A personnel skill consists of 3 levels layer.
How do you measure a skill?

Measuring function of skill is
✓ Knowledge
✓ Technique
✓ Experience

Measuring tools
✓ The skill map is useful to assume individual skill
✓ Interview and/or audit to each person to confirm skill
✓ Management judge the skill level of personnel
## SKILL MAP - Task of Injection system operation

<table>
<thead>
<tr>
<th>Grade</th>
<th>Essential Skill Items</th>
<th>Training</th>
<th>Auditing</th>
<th>Judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong></td>
<td>Assure each devices of the interlock mechanism for safety</td>
<td></td>
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<tr>
<td></td>
<td>Monitor the beam by profile and Emittance monitor on center console</td>
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<td></td>
<td>Confirm the beam transmission efficiency by faraday cup</td>
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<td></td>
<td>Record the operation data</td>
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<tr>
<td></td>
<td>Switch to local mode from remote mode on the sub-control panel</td>
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<tr>
<td></td>
<td>Load or save the file to controller by using center console</td>
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<tr>
<td></td>
<td>Apply the power to the Radio Frequency, RF, system and assure stability</td>
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<tr>
<td></td>
<td>Measure the energy of the beam</td>
<td></td>
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<tr>
<td></td>
<td>Reset the system and recover</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Use the oscilloscope</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Second</strong></td>
<td>Troubleshoot the anomaly condition</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Operate the upper ring and lower ring by the timeshare</td>
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<tr>
<td></td>
<td>Calibrate the beam energy at middle energy transport line</td>
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<tr>
<td></td>
<td>Adjust the beam for research using middle energy</td>
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<tr>
<td></td>
<td>Calibrate the beam for low energy</td>
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<tr>
<td></td>
<td>Adjust the RF when interference occurred</td>
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<tr>
<td></td>
<td>Stabilize the beam in ION sources</td>
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<tr>
<td></td>
<td>Create the new data file by using center console</td>
<td></td>
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</tr>
<tr>
<td><strong>Top</strong></td>
<td>Calibrate the width of the beam by selecting the current of each magnet</td>
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<tr>
<td></td>
<td>Calculate the beam orbit in reference to the beam envelop</td>
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<td></td>
<td>Select proper CFS based on the charge number of ion</td>
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<td></td>
<td>Irregular operation under the inoperative device(using adjacency magnetro)</td>
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<tr>
<td></td>
<td>Calibrate the beam center in each transport line</td>
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<tr>
<td></td>
<td>Calibrate the phase and gain of RF system</td>
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<td>Assure each device of the interlock mechanism for safety</td>
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<td></td>
<td>Repot the data sheet of research support for a researcher</td>
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<td>Switch to local mode from remote mode on the sub-control panel</td>
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<td>Reset the system and recover</td>
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<td>Use the oscilloscope</td>
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<td>Second</td>
<td>Troubleshoot the anomaly condition</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Create the stabilized beam with proper vacuum and gas volume</td>
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<tr>
<td></td>
<td>(HEC) Create the afterglow</td>
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<tr>
<td></td>
<td>(PIG) Recover the power when interruption occurred</td>
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<tr>
<td></td>
<td>(HEC) Remove and install the ferrocene container to minimize the consumption</td>
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<tr>
<td>Top</td>
<td>Free running and monitor the ion source for ageing</td>
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<tr>
<td></td>
<td>(PIG) Adjust the gap between filament and cathode of the PIG head</td>
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<tr>
<td></td>
<td>Troubleshooting the cause of unstabilized beam</td>
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<tr>
<td></td>
<td>Create ionic species corresponding to specific gas</td>
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</tr>
</tbody>
</table>
Sample of the Skill Matrix for individual

Individual Skill Matrix

<table>
<thead>
<tr>
<th>Group</th>
<th>Job title</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

History (Describe business contents before the employment)

<table>
<thead>
<tr>
<th>Date</th>
<th>Company name</th>
<th>Category</th>
<th>Business content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

History of the HIMAC

<table>
<thead>
<tr>
<th>Division</th>
<th>Group</th>
<th>Period</th>
<th>Work experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

License

The partition is separated by the functions

HIMAC Skill

Certification is given to each sub partition
Conclusion

- The SMP is a part of Quality Management System that give us a number of benefit.
- The SMP gives motivation to an Operator or maintenance person.
- Also, the SMP gives the improving of the team performance to a management.

The focus of Discussion

- How do you maintain operator ‘s skill ?
- How do you give the incentive to the operators ?
Thank you for your attention!