Experiences on implementation of On-the-Job Training programmes for maintenance personnel in Ascó and Vandellós II NPP

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Abstract. This paper presents a process and methodology for definition and implementation of On-Job-Training Programmes (OJTP) for new maintenance personnel in Ascó and Vandellós II. The content of these OJTP has been defined for each maintenance job position. A simplified task analysis was carried out to specify common and specific training. Generally, the specific maintenance training programs includes training modules in classroom and workshop environment on (1) maintenance of components and (2) maintenance fundamentals of mechanical, electrical and instrumentation. This specific training has been finally completed with a OJT programme based on the execution, observation or/discussion about the main maintenance activities under entitled worker supervision. Each lesson, task or activity is defined in a format where the training objective, milestones and deliverables are specified. The list of activities makes up the OJTP. It is based on applicable plant procedures and maintenance instruction to each job position.

Several participants or actors have been defined to implement the OJTP: co-ordinator of the process, tutors for each OJT task, line maintenance manager and trainee. Co-ordinator is the link among all actors. He knows the OJTP scope and plans the training activities according to the line maintenance manager. Co-ordinator carries out a tracking process, informs to training and maintenance managers about the progress in the programme, elaborates the progress and final reports and keeps training records. Tutors, usually entitled workers in the job position, transfer the knowledge to the trainee and discuss, review and assess the trainee’s performance. Trainee carries out the scheduled tasks, keeps records of work done, prepares deliverables and informs about his activities to the Co-ordinator.

The OJT programme for each new maintenance worker starts with a launching meeting with all involved actors. The goals of this meeting are to explain the OJTP scope and objectives, responsibilities of each actor, and planning of the first tasks to perform. The trainee receives a personal folder with OJTP content and formats to record the done activities. After the first meeting, co-ordinator held tracking meetings to assess the progress in the program and identify the missing activities in order to be planned for next periods. Finally, OJTP is closed when the scope is covered enough.

1. Introduction

The objective of On-the-Job Training Programmes is to provide hands-on experiences to the trainee within the job environment. OJTP is third phase of a comprehensive initial training and qualification for new maintenance personal in Ascó & Vandellós NPPs. These training actions are delivering in the frame of a generation change. The main challenge is to preserve the plant and equipment performance by transferring skills and knowledge from the output generation to new one. The scope of the OJT lesson plan should be built and focused on the in-depth knowledge required for performing specific and complex jobs. The training should provide hands-on in maintenance tasks and experiences in management issues as well, given that main group of new maintenance personnel are supervisors.

The first OJT programme was conducted in 2000 to a group of 10 maintenance supervisors and 2 maintenance managers of different disciplines. Currently, it is in course the third group of maintenance supervisors and the second group of maintenance craftsmen. There were not experiences on this kind of training before in Spanish NPPs.

The OJT programmes starts up after a set of generic and specific courses. The entire initial training plan is built within a global Systematic Approach to Training methodology. This paper presents the
2. Description of the process

There are no significant differences in the process than the regular SAT interrelated phases: analyses, design, development, implementation and evaluation. The specific SAT for the OJT definition and delivery has been carried out in the following steps:

- Step 1. Task analysis for identification of training needs
- Step 2. Design of training objectives and development of OJT guides for the job position.
- Step 3. Training implementation
- Step 4. Evaluation

The next sections describe an overview of specific work done and characteristics of each step.

2.1. Step 1. Task analysis and identification of training needs

In the overall SAT project for defining the initial training of maintenance personnel, each job position was analysed for identifying training needs. The results of this analysis provided the list of training objectives. Most of them are included and reached during the classroom and workshop environment modules of the initial training plan.

The main objective of this step has been the identification of the missing training needs that have not been reached in the classroom and workshop environment. These training needs require to be conducted in on-the-job environment.

To identify OJT training needs we use the following input data:

- Job position functions from Organization Manual
- Interviews to current workers and line manager
- List of plant procedures and maintenance instructions applicable to the job position

The above data are analysed taking into account the OJT main purpose for providing hands-on and experiences in supervision tasks. The output of this analysis is a list of selected activities to be included in the OJT programme for the job position.

2.2. Step 2. Design of training objectives and development of OJT guides

The second step includes the design and the development phases of a formal SAT process. The objective and output of this step is to elaborate the OJT guides for the job positions.

The list of activities or objective tasks from the step 1 is the started point for the design. Objective tasks are sorted out and grouped by similar or common related equipment and processes. All applicable procedures, maintenance instructions and other documents to conduct the task are identified in order to be references to the trainee. Then, OJT guides are elaborated using all this information.

Model and content of OJT guides is showed in the next figure:
On the Job Training guide content:

- Identification data: job position title, guide application to (Ascó, Vandellós II o both NNP), identification number associated with the job position and OJT title
- Training objectives with the targets that the trainee will be able to do after completion of OJT guide
- References, generic references applicable to all objective tasks
- Some instructions to explain or help trainee about how to carry out the objective tasks
- List of objective tasks or milestones to be performed by the trainee. For each milestone is possible to identify specific references
- Deliverables to be elaborated by the trainee. Deliverables give evidence of the task completion and provide a way for evaluation

The complete OJT programme is made up of set OJT guides for the job position. In general these guides are grouped by similar concepts:

- General guides concerning familiarizations with personnel, organization, plant/site layout, equipment location, tools, documentation, procedures, software tools…
- Relationships with other NPP section guides: Radiological Protection, Industrial Safety, Quality Assurance, Engineering, Operating Experience, Purchasing…The objectives of these training actions is to get a trainee familiarization with those tasks interrelated with other plant departments. For example, one of the OJT objective tasks for maintenance supervisor is to participate in a meeting with the Radiological Protection manager where the main PR annual objectives are described. Other issue to be discussed during the meeting is the identification of main maintenance tasks from the point of view of doses where the trainee has some responsibility. Other point is to participate in an ALARA meeting for a maintenance task under his responsibility.
- Processes guides such as maintenance task co-ordination and planning, work documentation, detailed outage planing elaboration, budget estimation, progress report, human resources management…
- Maintenance intervention guides focused on trainees make hands-on in the main and more specific components of the plant. Trainee should assume independent job responsibility for carrying out the maintenance intervention after completion of these OJT guide.

After de design and development phase, the OJT programme is explained and presented to a group of experts for approval. Usually the group of experts is made up of the following people:

- The job position direct manager
- Current worker(s) in the job position
- Training department representative
- Technician of the OJT programme definition
2.3. **Step 3. Training implementation**

The next phase of the process is to conduct the OJT training. To carry out this phase the following issues should be taken into account:

- Integration of all participants in the process
- Preparation of training material
- Launching of the programme. Kick-off meeting
- Tracking of the programme progress. Progress meetings
- Closing the programme. Final meeting
- Trainee assessment
- Process documentation

All above issues are described in the following sections.

2.3.1. **Role of participants in the OJT programmes**

One of the most important parts of the OJT process has been the selection of the participants in the training delivery and the definition of their functions. The actors will take part in the process are:

- Trainee
- Tutor or tutors
- The OJT co-ordinator
- Future direct manager of the trainee (line maintenance manager representative)
- Other plant section representative.

The next figure shows interrelations and role/functions of the participants in the process:

![Role of participants in the process](image)

**Figure 2. Role of participants in the process**

Co-ordinator is the facilitator of the process and the link among all actors. He knows the scope of the OJT programme and the “modus operandi” of the process. He prepares the training material (trainee’s folder) and keeps the training records. Co-ordinator makes a tracking of the process, identifies the progress and participates in the schedule of OJT activities. Co-ordinator is in charge to promote and arrange some training action related with other section OJT guides, like a meeting with Radiological
Protection, Industrial Safety, Quality Assurance… He transmits the training objectives and functions to all participants and informs about progress to the training department and maintenance line.

Other important actor is the tutor(s). Tutor(s) should be an entitle worker in the job position and he should transmit his knowledge to the trainee. Tutors should be qualified individuals working in the positions for which the trainees are being trained. Tutors must participate in the OJT meetings and should assess the trainees performance technically and his attitudes as well. Each tutor should have received instructions from his direct manager on the proper methods for conducting the training. They would be trained in how to perform progress assessments.

Future trainee’s direct manager plays the role of process supervisor. He should promote and enhance tutor(s) to transfer knowledge that is the ended goal. He should guarantee the programme fulfil. Jointly with co-ordinator should establish the lesson plan, trying to rotate the trainee around the all groups in the section in other to get a general overview of all maintenance jobs and cover all the scope. To make the lesson plan, co-ordinator will obtain form the “Maintenance Technical Office” scheduled tasks for training periods. Trainee’s direct manager will take advantage of unexpected significant tasks due to corrective maintenance to incorporate the trainee in the team work.

Finally the Trainee should perform the scheduled tasks and keep records about all work done. He should elaborate deliverables and will fill a diary of activities. He should inform to co-ordinator about all tasks done during the tracking meetings.

2.3.2. Conduct of “on the job-training programme”

The programme starts with a kick-off meeting with all involved participants in the process. A line manager, usually the trainee’s direct manager, the main tutor (current worker in the job position), the trainee, a training department representative and the co-ordinator attend to this meeting. The following issues should be discussed and agreed in the kick off meeting:

- The scope of the OJT programme and the schedule. Initially the OJT programme duration should not be defined. The programme starts with the kick-off meeting and finished when the scope of programme is considered enough covered by the training department and the line manager. Duration of the programme depends on opportunities to perform the objective tasks of the OJT scope, some of them only can be done or observe during refuelling periods.
- The role of each participant is explained and discussed for clarification
- The methodology or “modus operandi” about how to conduct the programme. This must include the definition of periods for tracking meetings and progress reports (usually ones a month).
- It is advisable to prepare the planing for the first period. Planing should include the main objective tasks for the first period based on the foreseen activities in the maintenance area.
- The trainee’s folder (see point 2.3.3) is delivered to the trainee with explanations about content and duties.

There is tracking of OJT programme progress. This tracking is performed periodically by progress meetings. There are two meetings each time:

- Co-ordinator meeting with tutors and line manger to: (1) assess technical performance and attitudes, and (2) plan activities for the next period
- Co-ordinator meeting with trainee to: (1) assess the progress in the OJT programme, (2) inform to the trainee about assessment results with identification of potential improvements if necessary and (3) present the main objectives and planning for the next period

A final meeting is hold to close the process when the scope of the OJT programme is enough covered. This meeting is similar to the tracking meetings but all records associated to process are collected for training documentation (assessment formats, deliverables…). If an important objective task has not been performed due to a lack of opportunity during the OJT programme, the issue could be remained opened until it will be done and documented.
2.3.3. Training material

The training material for conducting and documenting the OJT programme is the following:

- Trainee’s OJT folder
- Assessment formats

Trainee’s folder is the guide for conducting and documenting the OJT programme by the trainee. The main pieces of information in the trainee’s folder is showed in the following picture and described in the following points:

![Trainee’s folder content](image)

**Figure 3. Trainee’s folder content**

- An introduction presents the OJT programme. This introduction includes a general description. It is used in the kick-off-meeting. This introduction describes:
  - General objectives of the programme
  - Abstract of the OJT content
  - Description of participants in the process
  - Functions of participants
  - The “modus operandi” during the OJT delivery

- OJT guides. Some of them include formats for collecting information and formats for elaborating the deliverables. Trainee is requested to attach the deliverables to OJT guide.

- A diary of activities. Trainee is requested to record information about activities done every day. This format has a column for identification of associated OJT guide and a column for a short description of the task

- Tracking sheets. They represent a summary of the OJT programme status. They are used in the tracking and final meetings to assess the program progress. The tracking sheets provide the milestone of each OJT guide and columns to mark those completed, totally or partially.

Two formats have been elaborated to assess trainee performance:
• OJT assessment formats. This format is to assess the OJT scope done. Each OJT guide has an associated assessment format where the milestones (objective tasks) are described. It must record how the milestone was reached, if it was really done, observed, discussed or simulated. When all objectives are reached the format will sign by trainee, co-ordinator and direct manager. These formats are usually fulfilled at the end of the process.

• Attitude assessments format. Tutors or line managers are requested to fulfil this format in order to provide an assessment about application of safety culture issues, company values, human factors aspects such as leadership, teamwork, procedure compliance... Assessment of technical knowledge application is another aspect to be considered.

2.3.4. OJT programme documentation. Final Report
The OJT process finishes with the edition of a final report. Final report contents a global assessment of the training and attached records and documentary evidence of training delivery. The main contents of the final report are the following:

• Percentage representation of scope performed vs. total scope.
• Global assessment of trainee performance based on attitude assessment sheets and percentage of reached objectives from scope assessment sheets.
• Records of the process. Mainly trainee deliverables and trainee’s diary of activities
• Certificates
• Conclusions and remarks with identification of potential improvements in the OJT programme scope.

3. Final remarks
After conducting five groups of OJT programme to almost 40 maintenance workers of all specialities and levels, the experiences show the useful of the process.

There is nothing new in knowledge transferring than those repeated in the pass. Worker with experience takes care of the apprenticeship of new worker. That has been always done in any industry. The trainee figure has been always present but, when does the trainee finish the apprenticeship process, what is the lesson plan or which should the most important skills to practice?

The added value of the OJT delivered in Ascó and Vandellós is the methodology itself. A systematic process, using SAT principles, provides a tool to define programme with a coherent scope and clear training objectives. The process can be measurable in time. It possible to know the progress and the remaining tasks, in few words, the training process is under control. It is very important to have a systematic methodology, it has allowed overcoming the challenge to preserve the knowledge in an effective way. The transferring skills and knowledge from the output generation to the new one keeps equipment performance and experienced workers.

It was one of the main project objectives to built OJT scopes focused on the in-depth knowledge required for performing specific and complex jobs. OJT programmes have provided not only hands-on in maintenance tasks but experiences in management issues. Many of new maintenance personnel have supervisor and management functions. One important target is that trainee should assume independent job responsibility for carrying out his/her duties after completion of the process.

The results and experiences up to now allow to say that to establish a systematic process for the design, development and implementation of OJT programme has been useful and considered as good practice to keep maintenance personnel knowledge and provide an effective training.