

# ***Guideline for Production Ramp-Ups by using a Project Management Approach***

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**Abstract** — *Production Ramp-Ups on manufacturing environment represents one of the biggest challenges on manufacturing environments. These days, manufacturing environments are very dynamic. Based on the previous mentioned characteristics of production ramp-up, this study has focused on the creation of a management guidelines to provide to managers tools that will help them target the requirements during production ramp-ups. These tools will help them to breakdown the process in a set of detail steps with the required time to complete these tasks. Most of the techniques discussed have been adopted from the Project Management Discipline. Project Management Discipline has been developed to manage tasks or projects that are unique each one from the other, creating a very challenging environment with a high degree of uncertainty.*

**Key Terms** — *Execution Phase, Evaluation Phase, Work Break Down Structure, Gantt Chart*

## **INTRODUCTION**

Manufacturing Environments are very dynamic. Resources have to be managing in the most effective way. Even though most manufacturing processes are very repetitive, each situation presents a very unique set of characteristics that requires ingenuity and effectiveness. One of the most extreme scenarios is during production ramp ups. Production ramp ups are defined as the production increase of a specific product [1]. Even though most of the time, the product and process that is involved in the production ramp-up are well known to the organization, the amount of production requires new strategies to achieve them. Most organizations tend to encounter several problems to manage it properly.

Project Management Discipline has been recognize as one of the most successful disciplines to manage time. Techniques such as Work Break Down Structure (WBS) and time schedules have proven to be effective on the execution of project managements.

The objectives of this study were the improvement of managing and planning phases during production ramp-ups, methodology and protocols. Other objectives were the standardization of training requirements. Objectives were achieved by the proposal of a general methodology based on the Project Management Approach.

## **BACKGROUND**

Production Ramp Ups on manufacturing environments are very challenging scenarios. If an organization does not create a very good management strategy during ramp ups, it will create problems with the quality of the products, delay on the costumer's deliveries and ultimately the loss of businesses to competitors. According to literature, there are three phases on the production ramp ups: prototyping, pilot run and start of production [2].

The start-up phase is the last phase before mass production of a product begins. This significant occurrence is known as "start of production" (Sop). During this phase the ramp-up management has to evaluate this initial batch and approving the Sop [2]. In order to have a good result during the start-up phase is required to first run a pilot run.

In a pilot run phase, testing batches are run and parameters of the manufacturing of the process are adjusted to run a product with low manufacturing defects. The duration and complexity of this phase will depend greatly on the nature of the product and how sophisticated it is [3]. It is very important that all aspects of the production run are analyzed to identify any kind of problems that will arise with it

on different levels production levels. To obtain a very specific idea of how the production will behave it is necessary that a prototype phase is developed.

In the prototype phase, prototypes are developed to implement the exact conditions that will be seeing during mass production process. To develop these prototypes, experimental and development data gathered from designs and experience. These prototypes will reduce quality issues and reduces the time it will take to bring the product into market [3].

These phases help bring the most significant impact on the ramp-up strategies. The development of a model that serves as guideline to be successful in these phases, the study of the training strategies and the evaluation of how forecasts and costumer commitments can be adjusted to meet the ramp-up demands. Previously, the human portion has been studied such as recruiting, training and compensation. The training part specifically is very important because it provides the right knowledge to the resources that will support the activities performed during ramp-up. The creation of a model will serve as a guideline for managers during these times to be able to make faster and more accurate decisions.

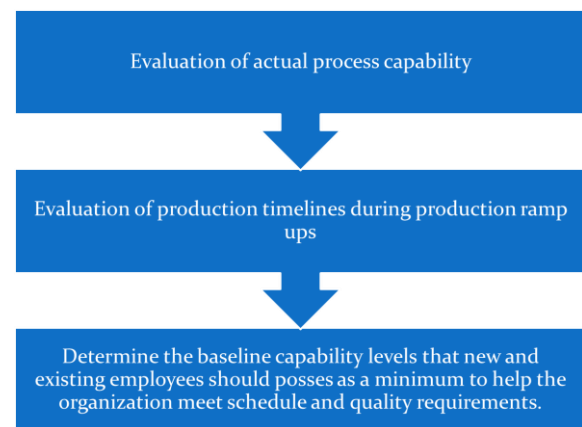
### ANALYSIS APPROACH

The proposed model includes two primary phases: the Evaluation Phase and the Execution Phase. On the Evaluation Phase, all aspects of the business are carefully assessed to create a detail profile of the actual condition of the impacted areas by the increase in production or ramp-up. This profile will include the evaluation of key organizational components. As shown on Figure 1 during the evaluation phase, the actual process capability will be evaluated. Process capability is assessed by the identification of how many process SME's are currently available and how much time they will be with the company. In terms of equipment and machinery, service life and actual condition of machines and equipment will be

assessed. Based on this assessment decisions in terms of outsourcing services or buying new equipment will be taken.

A second important point that is evaluated is the production commitments or timelines during the production ramp-up process as shown on Figure 1. Managers evaluates the aggressiveness of these commitments and important decisions such as re-negotiation of deadlines with costumers are performed and how much time it will take to achieve controlled processes with Cpk values of 1.33 and Six Sigma.

The last step, as shown on Figure 1, for the evaluation phase, is the determination of a baseline capability levels that new and existing employees should possess as a minimum to help the organization meet schedule and quality requirements. In this step manager determines the baseline capability levels that new and existing employees should possess as a minimum to help the organization meet schedule and quality requirements. In order to succeed training needs are identified by the evaluation of which are the necessary trainings depending on the nature of the organization and how intense these trainings will be.



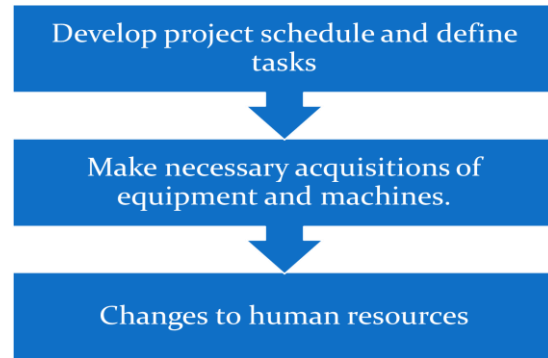
**Figure 1**  
**Evaluation Phase**

Through the evaluation phase, all the necessary information is gathered to start executing all required changes. These changes will be performed

during the execution phase. It is very important that an accurate plan has been developed and executed.

Through the proposed model, several key areas have been identified and techniques were suggested to help managers. These areas are the development of a project schedule and task definition, necessary adjustments on equipment and machines and the necessary changes on Human Resources, as shown on Figure 2. Changes on human resources includes the recruiting of personnel and cross train of existing personnel from other areas of the plant that has the best skill sets to support the increase in production.. Remaining required resources will be hired based on the previously defined qualifications necessary to achieve the production goals. The development of aggressive technical training in forms of advanced technical training, on the job sessions and classroom sessions that are designed to increase skill sets and competencies to meet and exceed the requirements of increase production. The focus of these trainings is to provide the basic, technical knowledge and hands-on experience necessary to meet and exceed production requirements. New or used equipment is necessary to cope with added production ramp-up steps. After careful evaluation of existing equipment, the necessary equipment will be bought with installation, start-up assistance and technical training as an entire package. The addition of more equipment to the existing facilities requires the modification of these facilities in terms of added utilities, square footage and electrical infrastructure.

As a first step mentioned on Figure 2 will be required to develop project schedules and define the necessary tasks to achieve excellence during production ramp-up. All necessary steps to develop a robust process that will create a process with CPk values of 1.33 will be determined as tasks and will be assigned timelines to achieve it. Constant reviews with the customers will be performed to have on board the customer. To complete successfully these phases will be required tools and strategies capable of delivering the required results.



**Figure 2**  
**Execution Phase**

A very useful strategy that helps answers one of the most important questions of the evaluation phase is the Work Break Down Structure (WBS). WBS is a strategy developed for the Project Management Discipline. It has been developed to determine each task necessary to complete any kind of projects. The WBS is developed between the owner of the project and the different SME's of the tasks that will be performed during the project to make sure that all necessary tasks are covered. During the evaluation phase a WBS will be used to identify all necessary trainings tasks, equipment and machinery installation and major overhaul activities required and the actual process capability. To execute it, Managers, Process SME's and support personnel will have regular meetings in which based on their experience and details of the extent of the production increase will be defined the necessary steps. After the main questions from the Evaluation Phase are answered (What, Where, When and How) the focus will be shifted to the execution phase techniques.

Gantt Charts provides big quantities of information related to tasks schedules. It also provides very important information such as start and finish dates for specific task on the project management discipline. On the models execution phase this technique proves to be very successful. By using Gantt Charts Human Resources Managers, Training development managers, Maintenance Managers Project Managers and Manufacturing Managers could track easily by

detail the progress of the tasks that were defined through the WBS. Time lines for each activity will be determined by the SME's of each affected process, equipment or training.

## **DISCUSSION**

During Production Ramp-Ups companies encounters many challenges that many times it ends in not meeting production commitments and ultimately harming the existing business. Each organization has a particular environment that makes it difficult to find a guideline or model that will fit all companies. Then intention of this model is to apply several project management tools that provide an efficient approach to the production ramp-up scenario.

Production Ramp-up process has been divided into two simple and universal phases, evaluation and execution phases. Both phases are developed to be a universal fit for any kind of organization by incorporating general aspects such as training requirements, hiring, equipment installation and time management.

## **REFERENCES**

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