An Investigation Study on the Shutdown Planning Process in BAPCO

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Submitted by
Manar Mohammed Althehiami
University number: 20021799

Supervised by
Dr. Saad Suliman and Dr. Yaser Alalawi
(Professor) (Assistant professor)

University of Bahrain

Kingdom of Bahrain
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Abstract

The preventive maintenance is a complicated process where a huge amount of work has to be accomplished in limited time and resources. This process costs millions Bahraini dinars every year. Even though, the current practice of preventive maintenance process in Bahrain Petroleum Company (BAPCO) is perceived to be of high standard, there is no evidence that this process cannot be improved further or optimized. Consequently, this study is aiming to provide proof of the usefulness of continuous process improvement and optimization by studying the Turn Around Maintenance (TAM) project implemented in BAPCO focusing on the scheduling process.

Creating a good schedule with good workforce allocation might be quite hard, and even more harder if it is decided to be optimized. This thesis proposes an optimization algorithmic approach based on a non-linear mathematical model. The aim from this approach is to minimize the total TAM project execution duration and maximize the workforce utilization. The approach is proposing a model that combines the scheduling and workforce allocation in one phase.

The data and information are taken from a number of TAM projects in the refinery, evaluated from different points of view taking in consideration the time and size of the workforce needed for each activity in the process, starting from shutting down the unit, till starting the unit again. The results show that the proposed algorithmic model provides good workforce deployment and produces a detailed schedule specifying when each task starts and when it is expected to end, and how many workers are assigned for each task. The model takes in consideration the un-identical multiprocessors system (different departments with different skills).

The major conclusion is that using the proposed model saves time and effort, provides an optimized schedule and workforce allocation plan, and as a consequence it improves the efficiency and effectiveness of maintenance systems. The efficiency of the proposed algorithm in terms of computation time is affected mostly by the number of assigned tasks and tasks’ branching density of the dependent tasks.