The application of Total Productive Maintenance to the storage and maintenance area of *Tren Urbano*: Case Study:

Motor Bogie

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Executive Summary

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Executive Summary

In an operational system quality, productivity, client's satisfaction, security, equipment conditions and maintenance are some of the most important aspects and challenges of nowadays industries. A total maintenance can be the key to success; therefore must industries are developing different programs and techniques to control their maintenance. Tren Urbano (TU) is one of the must interesting and main industries of the island. No strategy has been planned for the maintenance of the operational system of the train, which is almost ready to use. An application of a maintenance technique must be necessary to follow up the complete and successful implementation of TU.

The purpose of this investigation is a development of a maintenance program. There is a state-of-the-art technique called Total Productive Maintenance (TPM). TPM has the potential of being applied to any operating system, including the TU Storage and Maintenance Facilities (S&M) located at Martinez Nadal, in Güaynabo, Puerto Rico. TPM is a maintenance program, which involves a newly defined concept for maintaining facilities and its equipment. TPM will be applied to the Motor Bogie, which includes the suspension system, friction brake system and other electrical systems. Consequently the objectives of the research are to investigate TPM strategies for its application to the Motor Bogie to increase the efficiency, effectiveness and security in the operations of TU's vehicle; generate a specific format or formula including all processes, parts and maintenance given to the Motor Bogie; apply TPM to all possible processes in the S&M of TU using the specified given format; involve all the people working in the S&M to build an adequate environment that will minimize breakdowns, improve quality and motivate workers to increase their involvement and aim a world-class quality for the S&M of TU.

To achieve the project objectives, TPM information was gathered. TPM maximizes the equipment effectiveness and productivity, and eliminates all machine losses; creates a sense of ownership in equipment operators through a program of training and involvement; and promotes continuous improvement through small-group activities involving production, engineering, and maintenance personnel. TPM has had great benefits in industries: eliminates accelerated deterioration of the equipment, tries to eliminate failures and defects, operates profitably (no breakdowns), assures quality of the product, improves equipment availability, met delivery times, eliminate environmental and safety hazards, etc. The benefits aren't only in the industry; the effects are on the employees, too.

Additionally to the information gathered and out of the TPM technique conversations with some entities like Marjorie Mictil from Caracas Metro, Venezuela and José Colón from Intel, Las

Piedras, Puerto Rico has being established to study their maintenance programs, which are really effective.

A TPM Organization or dedicated personnel that are helping with the maintenance program has being formed including Ron Mackay, Lorraine Z. Lerman, Christian Fonta and John Morales from Siemens Transit Team Puerto Rico; and Sonia Bartolomei, Daniel Dávila, Obed Santos and Sara Rullán from UPR-Mayagüez.

The activities that will be performed are part of the complete TPM execution. Determine the performance and conditions of the actual equipment that will be used. Develop an effective system of Preventive Maintenance (PM) that will be used to maintain the equipment to its highest level of required performance (inspection, equipment clean, replenishment time, and replenishment process). Construct a list of PM Check. Develop work orders based on predictive maintenance. Develop a PM program. Maintain an equipment history. Develop PM Reports.

Some preliminary recommendations can be made based on the case study: Motor Bogie. A useful recommendation is to establish a standardized model for the motor bogies of the trains. And to bring the vehicles to the work area therefore the operations and maintenance strategies can be established in a better way with a more accurate model.

Companies practicing TPM achieve startling results, particularly reducing equipment breakdowns, minimizing idling and minor stops, lessening quality defects and claims, trimming labor and costs, shrinking inventory, cutting accidents, and promoting employee involvement. All of these benefits can be applied to TU

Given the adequate maintenance: the equipment will not deteriorate which means that the cost of the requirement of new equipment will decrease; elimination of failures implicate that the occurrence of accidents will decrease; elimination of defects reduces loss of time and resources, all the production is effective and operate profitably, all this reductions and increases leads to profits for TU. Finally a document or formula will help as a model for different parts and processes that will exist in the S&M.

Combining the theory, the process analysis and the experience a perfect a productive maintenance program will contribute to the complete success of TU's S&M and to the TU entity at all.