Underground Fiber Placement Equipment Maintenance Plan

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Abstract

Genesis Communications Inc is one of the leading telecommunications companies in Puerto Rico. The company picked a project to turn losses into revenue in less than three months. The project proposed was the Underground Fiber Placement Equipment Plan. Before the implementation of the Maintenance plan the Overall Equipment, Effectiveness was 54.78% and after the implementation the Overall Equipment Effectiveness is 94%. The method consisted in elaborating a plan where each equipment will have their own check list for each operator to check daily and report any changes to successfully attack problems encountered. Each operator is trained and transmitted the necessary knowledge to maintain and keep equipment at high standards. With this achievement, the Employees Productivity, Equipment Longevity and Spare part have all been maximized drastically. The Company now focuses the revenue from this project by catering to all employees through benefits including better health care, paid time of and many more services.

Abstract

Private telecommunications consultancy companies depend on the quality, production rate and employee management all to complete projects at the agreed deadlines. Many things situations can make a company lose revenue and competitiveness such as lack of quality, poor employee productivity, constant equipment breakdowns and very bad management. The company proposed a three-month project to turn losses into revenue. The company will invest the earnings of the proposed project towards the benefit of each employee.

Problems & Objectives

The main problem that Genesis Communication faces is the constant battling with equipment breakdowns. Meaning GCI is incurring in employee overtime payments, little or no productivity from equipment or employees. GCI is also being backlashed due to not completing projects as per contract deadline requirements. This also affects the company reputation in competing in future project bids.

To solve the mentioned problems, the company have decided to implement a maintenance plan. The main objectives to completely solve the mention problems are the following.

- Increase of equipment longevity.
- Increase of employees and equipment productivity.
- Decrease the cost of spare parts

Problem Approach

In order to resolve the mentioned problem the company completed an Equipment Assessment & Data Collection on The Boring Equipment.

•The main purpose is to implement a Total Productive Maintenance towards their state-of-the-art boring equipment. The main purpose of this equipment is to perform Horizontal Directional Drilling without affecting traffic or the environment. Therefore, the equipment is very sensitive to failures and downtime if not looked after daily. The main problem is that the machine is down 40% of the time. Hence why TPM will be implemented to support this equipment.

Figure 1: Vermeer Boring Machine

Data Collection & Analysis

During collection and data analysis from the raw data obtained from the field work on the boring machine equipment the following data was obtained and analyzed using Equations (1) to (4). By using these equations, it will give the company a better understanding on what to improve and how to improve at the time of Total Preventive Maintenance Implementation [1].

$$\text{Availability (Down Time Loss)} = \frac{Time\ available\ for\ production - Down\ Time}{Time\ Available\ for\ production} \quad \bullet \text{ Equation (1)}$$

$$\text{Performance (Speed Loss)} = \frac{Ideal\ Cycle\ X\ processing\ quantity}{Operating\ Time} \quad \bullet \text{ Equation (2)}$$

$$\text{Quality Yield (Quality Loss)} = \frac{Operating\ Time - defect}{Total\ processed\ quantity} \quad \bullet \text{ Equation (3)}$$

$$\text{Overall Equipment Effectiveness} = (\text{Availability})(\text{Performance})(\text{Quality Yield}) \quad \bullet \text{ Equation (4)}$$

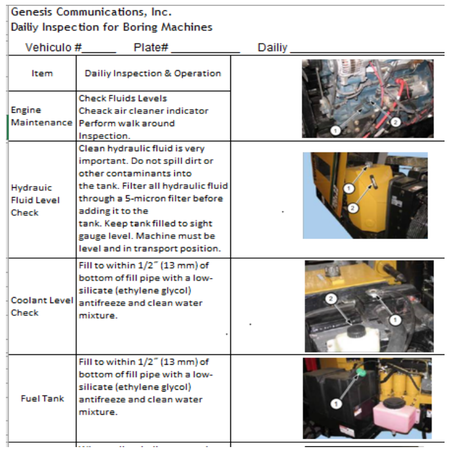
The Following data was collected and used. Using Equations (1) to (4) the company also obtained the results:

- Time machine was available for production: 720minutes
- Down time machine: 120 minutes
- Ideal Cycle: 100 miles
- Processing quantity: 400 miles
- Operating time: 400 miles
- Defects: 0

- Availability: 83%
- Performance: 66%
- Quality yield: 100%
- Overall Equipment Effectiveness:54.78%

Total Preventive Maintenance Implementation

Each employee who operates the equipment underwent a complete training a Daily maintenance procedure seen in Figure 2-3. This Daily Maintenance insures the durability and longevity of the equipment being used on a certain project. This will allow operators to capture breakdowns before even happening.

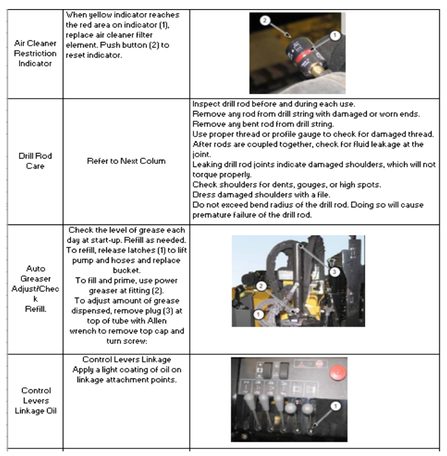


Genesis Communications, Inc.
Dailiy Inspection for Boring Machines

Vehiculo #_____ Plate#_____ Dailiy _____

Item	Dailiy Inspection & Operation
Engine Maintenance	Check Fluids Levels Cheack air cleaner indicator Perform walk around Inspection.
Hydrauic Fluid Level Check	Clean hydraulic fluid is very important. Do not spill dirt or other contaminants into the tank. Filter all hydraulic fluid through a 5-micron filter before adding it to the tank. Keep tank filled to sight gauge level. Machine must be level and in transport position.
Coolant Level Check	Fill to within 1/2" (13 mm) of bottom of fill pipe with a low-silicate (ethylene glycol) antifreeze and clean water mixture.
Fuel Tank	Fill to within 1/2" (13 mm) of bottom of fill pipe with a low-silicate (ethylene glycol) antifreeze and clean water mixture.

Figure 2: Maintenance Plan



Air Cleaner Restriction Indicator	When gellow indicator reaches the red area on indicator (1), replace air cleaner filter element. Push button (2) to reset indicator.	
Drill Rod Care	Refer to Nest Colum	Inspect drill rod before and during each use. Remove any rod from drill string with damaged or worn ends. Remove any bent rod from drill string. Use proper thread or profile gauge to check for damaged thread. After rods are coupled together, check for fluid leakage at the joint. Leaking drill rod joints indicate damaged shoulders, which will not torque properly. Check shoulders for dents, gouges, or high spots. Dress damaged shoulders with a file. Do not exceed bend radius of the drill rod. Doing so will cause premature failure of the drill rod.
Auto Greaser Adjust/Check Refill.	Check the level of grease each day at start-up. Refill as needed. To refill, release latches (1) to lift pump and hoses and replace bucket. To fill and prime, use power greaser at fitting (2). To adjust amount of grease dispensed, remove plug (3) at top of tube with Allen wrench to remove top cap and turn screw.	
Control Levers Linkage Oil	Control Levers Linkage Apply a light coating of oil on linkage attachment points.	

Figure 3: Maintenance Plan

Method Used

The main tool that was used to improve the availability of the equipment is the Total Preventive Maintenance Tool. The guidelines used to for the success of the project is on Figure 4.

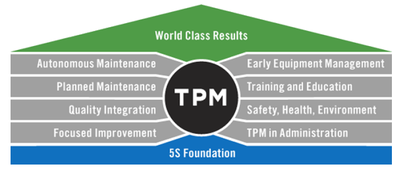


Figure 4: Total Preventive Maintenance Guidelines

Results

Full Implementation of the Total Preventive Maintenance Plan was achieved. An early Maintenance Plan was implemented with the sole purpose to achieve milestones established by management. The Daily Maintenance Prevention Design minimizes future maintenance cost and deterioration losses of the new equipment by considering the necessary planning and construction [2]. During the implementation of the mentioned plans, many important aspects were taken into consideration. With the use of Total Preventive Maintenance guidelines structure the team elaborated crucial steps to achieve project

A full assessment of the equipment was performed to calculate the Overall Equipment Effectiveness after the implementation to view positive results which were the following:

- Time machine was available for production: 720 minutes.
- Down time machine: 40 minutes
- Ideal Cycle 150 miles
- Processing quantity: 400 miles
- Operating time: 600miles
- Defects: 0
- Using Equations (1) to (4), the company obtained:
- Availability: 94%
- Performance: 100%
- Quality yield: 100%
- Overall Equipment Effectiveness: 94%

Conclusion

The company picked a project to turn losses into revenue in less than three month All the objectives presented during the beginning of the project have been completed and accomplished. Results presented helped improve employee's productivity drastically since equipment are not constantly broken-down. Equipment longevity are now up to last ten or more years. The company will be investing their revenue from this project towards their employees benefits such as raises, medical insurance, and 401k. The project completed is the first of many to continue growing the company and its horizons. Many tasks were performed to complete the project such as the following: Addition of diverse team members, complete equipment assessment plan, data collection and analysis, operational procedures and approvals, Implementation of a fully functional Maintenance Plan.

References

[1] Micromain, (2019) What is Preventive Maintenance? Retrieved from: https://www.micromain.com/what-is-preventive-maintenance/

[2] Stevenson, William J. (1996). Production/Operations Management. (Fifth Edition) [McGraw-Hill].