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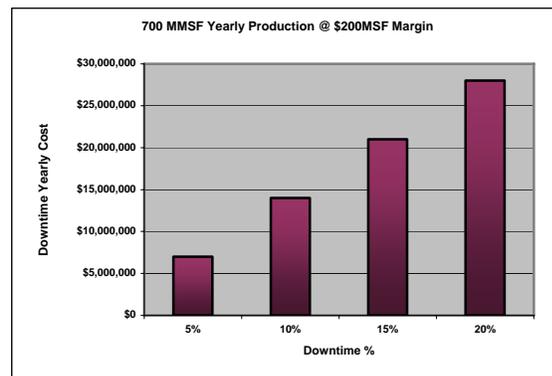
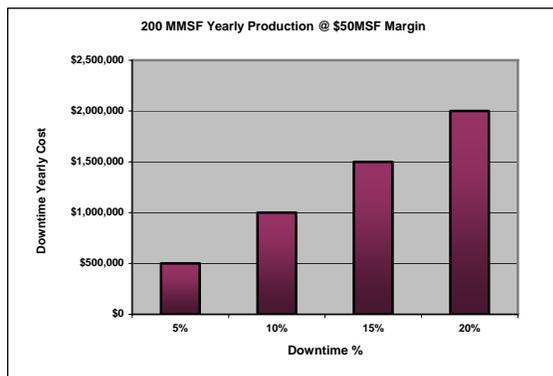
### **Up-Time and How to Reduce Downtime: Downtime Measuring and Reduction**

By George Meek  
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It's 2 PM Saturday afternoon, you're the shift production supervisor, and you get a call from the press operator station; "We just had an overload trip on number four press pump!" You tell the operator, "We had this problem yesterday too, let's get maintenance down there and look at that pump". You think to yourself, we sure have a lot of problems with pumps.

Downtime tracking information is essential to correct ongoing machinery problems and deficiencies, and to fine-tune the maintenance and operations management systems. Many facilities do not measure downtime and if they do, they often miss opportunities that can help the plant in larger ways than correcting one downtime event.

Downtime costs plants millions of dollars each year in loss production, downgrade, and loss of customers. It is important to know what is causing the downtime and how to use this information to correct the problem.



### **Downtime Collection**

There are various methods used to track downtime. The simplest of methods is where an operator simply fills in a log book noting what happened, what was done, and how long they were down. This is where many older plants started. Even today, some plants still do not measure downtime.

As the wood panel plants started to mature in the 1970s, many switched from using logbooks to adding downtime details on production forms that were collected at the end of the shift. These forms were kept on clipboards and were available for plant personnel to read. When the clipboard got full, the forms were filed. When using logbooks and forms, trending was not typically reviewed except for a month end report that listed the total hours down. Sometimes

plants would separate the maintenance from operational downtime, and maybe even by craft (electrical vs. mechanical) and, if they were clever enough, by equipment area such as press, former, drying, etc. Scheduled and unscheduled downtime would be tracked as well. It is important to evaluate both scheduled and unscheduled downtime to attempt to reduce each.

In the 1980s, the beginning of the computer era, we started to use spreadsheets and databases to track downtime. In the first years many plants still collected downtime from forms filled out by operators and administrative personnel would fill in the spreadsheets and databases. This allowed for misinterpreted information, which often resulted in misrepresentation of root cause.

By the 1990s computers became faster and less expensive. The spreadsheets improved and some plants had operators input data into home-brewed downtime databases or they were using software sold by various companies. It wasn't until the mid 90s when computers were quite fast and had large memories that plants really started to understand the importance of good downtime data. We then saw plants use more sophisticated databases to track downtime. By now many plants were also evaluating Overall Equipment Effectiveness or OEE, which is the true cost to the plant. The overall performance of a single piece of equipment (or even an entire plant) is governed by the cumulative impact of the three OEE factors: 1) availability (or downtime), 2) performance rate (or optimum production rates), and 3) quality rate (or downgrade). OEE is a percentage derived by multiplication of these three factors.

Plants can now buy web-based systems that can report real time OEE or downtime information for instant management control. Software packages are available to connect to equipment controls to indicate precise time and device information. These same controls can also track OEE. Some maintenance software systems have some downtime tracking capability, or they can be modified to accept downtime tracking. Some plants still rely on their own database packages, while there are some wood products plants that still do not even collect downtime information.

### **Benefits of Downtime Analysis**

Downtime tracking and analysis is reactive. Something happens, and we do something about it -- after the fact. With good maintenance and operations programs developed, downtime can be reduced. We have not advanced our technology and the wood products industry to the point where it is possible to operate without downtime. There are some plants that are working toward a yearly goal of 97% for 365 days. Currently a wood products plant is considered to be running well if it has 95% total uptime. That includes all scheduled and unscheduled downtime. This calculates out at 22.8 hours per day or 18.25 days per 365 days per year. Even at 95% uptime the lost time during the year represents a substantial decrease to possible profit margin. Short duration, repeat offenders will cause downgrade product. Wood products plants are meant to operate all the time with scheduled, proactive maintenance. If the plant is up and down all the time, not only is there loss in production, but also there can be product quality, safety, and environmental issues. Good downtime analysis will help both maintenance and operations in determining the root cause of nagging problems.

### **Effective Downtime Collection and Analysis**

For downtime information to be effective, the data must be easy to enter, easy to understand, and must include enough detail to allow good root cause analysis. The latest automated systems will collect accurate information if enough effort is placed into monitoring the correct components, and the operations and maintenance personnel add their comments.

For non-automated systems, the right information needs to be collected and entered. The operator needs to add the time that production stopped and started. If this goes past a shift, the next operator should enter the startup time. Items that should be recorded include:

1. Stop/start times to the minute.
2. Operators name, shift, and crew.
3. Plant area(s) affected, such as Lathes.
4. Plant equipment shut down, such as Lathe #1.
5. Equipment area such as Lathe Spindle, and the equipment identification code or number.
6. Sub-equipment, if known, such as Lathe Hydraulic Pump #2, and the equipment identification.
7. The component that failed, if known, such as the pump itself or even better yet the pump front bearing.
8. Failure code, such as: Tripped, Stopped, and Jammed.
9. The reported problem, such as “The pump overloaded and kicked out”.
10. The action such as: Welded, Replaced, Filled, and Cleaned.
11. Shift maintenance review approval. Someone from shift maintenance during which the event occurred reviews the downtime entry and approves the details, or has further comments.
12. Maintenance comment example: “After resetting this motor overload and restarting, we noticed high vibration from the front pump bearing. We checked the pump bearing temperatures and vibration level and it exceeded safe operating conditions, so we shut down and replaced the pump.”
13. Shift supervisor review approval.
14. Shift supervisor comments.
15. Maintenance management approval.
16. Production management approval.
17. Work order number for this event.
18. Root cause: Lack of lubrication.
19. Root cause program failure: PDM.
20. Root cause program failure note: “This pump had not been identified as requiring vibration analysis.”
21. Follow up required: “Add pump to vibration analysis route. Repair pump removed.”
22. Follow up work orders. There may be more than one.

What a list! And to think we started downtime tracking by simply entering some details in a logbook. Not all of these are required, but they will help you determine the root cause much easier. When using a database, drop down choices can be selected to speed up the process of selecting the various options. Options should be parent/child driven, such that when you select “pump” as the component, there are limited choices for pump failures. The same holds true for equipment. When the press area is selected, only the press equipment and its sub equipment should be listed as drop down choices.

Now that you have collected data, what do you do with it? Hopefully not what we did with the paper forms we collected before -- when the clipboard got too full we tossed them or maybe put them in a box to store somewhere. It is good to review downtime daily and assign someone to correct the issue. Sometimes we get so tied up in looking at the day-to-day issues, and not finishing what we started yesterday, that we lose track and never get back to solving the root cause of larger problems. At least with work orders we have a better way of tracking these opportunities. But what do we do with the history?

Downtime history is the key to preventing downtime, as long as the right data is collected. We need to know the following from the data collected:

1. When did it happen? Date and time.
2. How long was production down?
3. What plant area, equipment, sub-equipment, and component failed?
4. Who was involved?
5. What was the root cause and solution?
6. What type of program failed? Was it due to PM, training, management decision, improper engineering, improper installation, or poor design? What caused the component to fail and forced the plant to shut down?
7. Is this a repeat offender? Have there been multiple events of the same problem? How many times, and is there a trend?
8. Is it happening at a certain time or season? Is there some typical frequency?

By using a database, charts can be developed to show trends, which can lead to root cause analysis and solutions. Scheduled downtime should not be overlooked too when analyzing downtime. Charts should include:

1. Downtime by year
2. By month
3. By day
4. By crew
5. By shift
6. By plant location: Log Yard, Press Line #2, Finishing
7. By equipment: Press Loader, Core Flaker
8. By component: pump, motor, switch, gearbox, conveyor belt
9. By failure code: overload, tracked off, spark detect
10. Root cause program failure: PDM, Training, Resources, Engineering/Design, etc.

With good information on downtime, problems can be solved and downtime reduced. When a downtime event happens such as a pump bearing failure because of misalignment, you need to not only resolve that pump/motor issue, but also look at other alignment issues with similar pump/motors, and the alignment program for the complete plant. By identifying a potential program failure such as the PM procedure of checking for misalignment (and correcting that for the plant not just the one pump that failed), you will solve many more problems and reduce downtime quicker for all items, rather than fire fighting and chasing misalignments each time they occur.

You can't work on everything at once. You must prioritize those items that cause the most downtime hours and the most events. Select the top three for each and then solve them. Select the top three downtime events by hours; and the top three for frequency for the plant, by plant area, by component, and program failure. You may have other downtime problems you resolve right away to keep running, but you must have an ongoing list of priority downtime related projects in front of you to reduce downtime. When you have solved one, add another to the list. Reducing downtime will increase the plant profit margin.

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Evergreen supplies maintenance assessments in which we evaluate all the maintenance programs including data collection, documentation, training, resources, reliability, planning, and scheduling. Evergreen can assess how you are collecting downtime, production efficiencies, and downgrade information to help optimize your operation. [www.evergreenengineering.com](http://www.evergreenengineering.com)