

PREVENTIVE MAINTENANCE OF YOUR PRECAST PLANT EQUIPMENT


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BACKGROUND


- Andrew Hayward, P.E.
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- Third Generation Precaster
- Full Time Employee since 2008
- Civil Engineering Graduate of University of Nebraska

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OVERVIEW


- Is Your Plant at Peak Performance or Peak Reactiveness?
- What Really Needs a Maintenance Plan?
- What are the Different Types of Maintenance?
- What are the Different Types of Failures?
- Now, Time to Develop that Maintenance Plan!
- What are some Examples of Maintenance Types of Precast Equipment?
- Why you Can Not Ignore Maintenance!

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DOES YOUR PLANT RUN AT PEAK PERFORMANCE?




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OR, IS YOUR PLANT REACTIVE?




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WHAT REALLY NEEDS A MAINTENANCE PLAN?

- Any piece of equipment that provides a crucial function to your production process.
- Concrete Mixer, Overhead Cranes, Forklift, Q.C Testing Equipment, Vibrators, Batch Computers, Molds/Forms, etc.
- Almost everything in your plant serves as a crucial item.
- Most all the equipment in a plant is very expensive and will cause lots of lost revenue in downtime.
- However, not all need to be maintained in the same ways.

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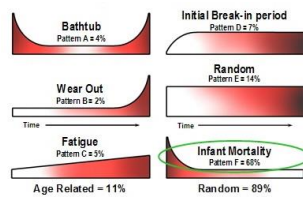
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DIFFERENT TYPES OF MAINTENANCE

- Preventive Maintenance – Maintenance that is performed routinely on a piece of equipment to keep it running at optimal capacity, efficiency, and safety without pre-mature failure or costly downtime.
- Conditional Maintenance – Predictive in nature. Maintenance based on observation and monitoring of equipment.
- Run to Fail – No maintenance scheduled.
- Redesign – Redesign from an equipment hardware or operators standpoint.

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TYPES OF FAILURES



- Study was conducted in the 1960s for the airline industry
- 11% are Age Related
 - These are suited for Scheduled/Preventive Maintenance
- 89% are Random
 - Failures are not dictated by a wear out time.
 - These are not good for Scheduled/Preventive Maintenance
- Not all parts will wear out. Some will randomly fail. These failures will take any of the 6 modes shown previously.

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MORE ON PREVENTIVE MAINTENANCE (P.M.)

- Only about 20% of equipment failures are helped by Preventive Maintenance
- Failures A, B, & C represent this.
- For Items with known life spans. Good for oil/fluid changes.
- Failure C is more indicative of parts rubbing in direct contact with each other. I.E. Clutches, Brakes, Belts, non-greasable trunions
- P.M. is usually much more intrusive and causes more downtime as major maintenance is usually being performed.
- Can result in "Throwing the Baby Out With the Bathwater." Their may be perfectly good parts being replaced just because that is the schedule time for maintenance. This results in wasted money on parts and labor.
- Generally used because Operators Manuals tell you to.
- Open the door for more human error leading to future expediated failure.

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MORE ON CONDITIONAL MAINTENANCE (C.M.)

- Most parts will fail randomly (about 80%)
- Instead of scheduled maintenance, operators listen, observe, and inspect the equipment. As any variations arise, the problem is addressed. (Is it hotter to the touch than usual? Does it sound different?)
- Looking for the indications that the piece of equipment is in the act of failure.
- Most items will last for a long time under this technique.
- Changing Tires is a good example.
- We all probably know or have seen the 80 year old guy driving around his same pickup from 40 years ago that has never been repainted or had an engine overhaul. You can bet he was using C.M.



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MAINTENANCE PLAN DEVELOPMENT

- Start with a few pieces of equipment. Generally, your most important or the ones that cost you the most in maintenance.
- Observe your equipment and note any of the 6 major losses:
 - Breakdowns = No Availability
 - Setup & Changeover = No Availability
 - Reduced Operation Speed = Less Production
 - Idling and Minor Stoppages = When equipment is sitting idle, waiting, or being cleared
 - Rate of Quality = Equipment requires a warm up period before the ability to produce good quality products.
 - Quality Defects & Rework = Always look for ways to run consistent First Quality products

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MAINTENANCE PLAN DEVELOPMENT (CONTINUED)

- Develop a Work Order System
 - Help to track time spent, parts, and frequency on issues
- Create Binders with Owner's Manuals and Maintenance Logs for major pieces of equipment.
- Develop pre-use checklists

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MAINTENANCE WORK ORDER

Your Company Name _____
 Address _____
 City, State, ZIP _____
 Phone Number _____

PREVENTIVE MAINTENANCE REPAIR
(Indicate type of work required)

PROFORMA SAMPLE

Work Order Number _____ Date _____
8-29-17
1528

A. Check outside for leaks or missing sealants
 B. Check exterior finish
 C. Check trim and paint
 D. Check interior
 E. Check empty oil level
 F. Check high pressure areas of steel supports
 G. Check fasteners
 H. Check joints or bolts
 I. Check for rust

Describe Work _____

NO.	DESCRIPTION	DATE	BY

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MAINTENANCE PLAN DEVELOPMENT (CONTINUED)

- Label or create visual aids to assist in routine maintenance.
 - I.E. Greasing, cleaning, etc.
- Engineer/Fabricate things to help make maintenance easier
 - Grease Manifolds to supply grease to hard to reach locations.
 - This saves time and also helps to ensure grease is getting to places it probably wasn't before.

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MAINTENANCE PLAN DEVELOPMENT (CONTINUED)

- Determine what parts are needed to keep on hand for spares.
 - This prevents the need to overnight parts or spend hours looking
 - Keep an organized system to store parts. One way might be to keep a parts shelf for the required piece of equipment next to the actual piece of equipment. Another might be, all in one centralized location.

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MAINTENANCE PLAN DEVELOPMENT (CONTINUED)

- Though the previous items are important, they will all fail unless you Train and Engage those responsible for the equipment.
 - Users must take ownership
 - Train them to notice the variations in the sounds, vibrations, nuances, the equipment runs with.
- Take the time to understand the equipment and maintenance it requires before putting it into service.
- Keep Clean.
- Don't ignore the warning lights, buzzers, etc.
 - These are letting you know something is failing or has failed.
- Most Equipment will let you know when things aren't going right.
 - Don't miss the signs.

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TYPICAL PRECAST EQUIPMENT AND THEIR MAINTENANCE TYPES

- Run to Fail
- Run to Fail
- Preventive & Conditional
- Conditional
- Conditional

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YOU CAN NOT AFFORD NOT TOO!

- What contributes to the actual cost of a breakdown/downtime?
 - Consider a Utility Vault Form for example:
 - You only have one of these, so everyday it's down is taking away from production totals
 - Someone is being paid to fix the form.
 - If this is done in house, that individuals normal production is reduced for the duration of the repair.
 - Do you have parts on hand or need them overnighted?
 - Might impact product delivery date. This in turn could cause penalties for delays to project completion.
 - Crews must work Overtime to get the products shipped on time.
- Now just think about it if it was your Batch Plant.

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TRUE COST OF A BREAKDOWN

- Example: Employee A Notices bent bolt with stripped threads when closing up a 8'x8'x8' box culvert jacket. Just skips tightening. Approx. 7 yard pour of accelerated / s.c.c. concrete.
 - Result: Concrete blows out the form 75% through pouring box. Concrete is now everywhere. Possible bent form Jackets.
 - Now What?

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THE AFTERMATH!

- Day 1, 3 Employees have to clean up. Payroll liability is \$40/person/hr. Plus one Foreman oversight at \$60/hr. Takes 2 hours to clean up the concrete.
 - 2 hrs x 3 employees x \$40 + 2 hrs x \$60 = \$720.
 - Concrete \$140 per yard at 7 yards
 - 7 yds x \$140 = \$980.
 - Form Set up time prior to pouring. 3 Men at 4 hours.
 - 4 hrs x 3 employees x \$40 = \$480
 - Reinforcing cage. 2 hours to fabricate and 400 lbs steel.
 - 2 hrs x 3 employees x \$40 + 400 lbs x \$0.65 = \$500
 - Day 2, Repairing the bent form panel. 4 hours at a welding shop.
 - 4 hrs x \$120/hr = \$480
 - Cost to transport form around town.
 - 1 hr x \$50/hr = \$50
 - Day 3, Resetting form, cage, and pouring.
 - \$720 + \$980 + \$480 + \$500 = \$2680
 - Cost of Repouring and Repairs= \$2,680 from second pour + \$2,680 from first pour + \$530 in Repairs = \$5,890.
 - Sale Price of 8x8x8 Box Section \$5,000. Cost of 2 days of lost pouring = 2 x \$5,000 = \$10,000
 - Final Incident Cost = Sale Price of Boxes Made \$5,000 - Total Cost of Repour \$5,890 - Lost Days Pouring \$10,000 = \$10,890

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WHAT COULD HAVE BEEN

- That 3/4" x 3" Bolt.....
 - \$2.53 at Home Depot and probably in your bolt bin already.
- So, do you want to be the one to tell the Boss that you figured he was better off losing out upwards of \$10,000 in lieu of that silly little \$3 Bolt?
- Don't skimp. Do the Maintenance!
- Could Also Prevent Injury!



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