Getting to the Root

5 WHY'S

GAP IMPROVEMENTS

Introduction

The 5 Why's is a simple brainstorming method that provides direction towards solving a problem. This iterative questioning method explores the relationships (cause & effect) underlying your problem.

While you want clear and concise answers, you want to avoid answers that are too simple and overlook important details.

Typically, the answer to the first "why" should prompt another "why" and the answer to the second "why" will prompt another and so on; hence the name Five Whys.

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Seeing vs. Understanding

Like many things we learn from Toyota, we “see” what they are doing but fail to understand what they are doing. The 5 Why is another example of our misunderstanding.

Taiichi Ohno stated *“By asking why five times and answering it each time, we can get the real cause of the problem”*

So, we get in our groups and ask ourselves why five times and expect that ‘event’ to solve our problem. Even worse, we may have asked questions (Why’s) to which we already knew the answers.

The underlying theme is when we have problems, it should be obvious that we don’t have the knowledge to solve them, if we did, we would have solved them.

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Experiment

If a problem is the result of our lack of knowledge, doesn't it make sense to perform experiments to gain knowledge?

Mike Rother and Constantin May suggest *"Finding the root cause of a problem is typically not possible through discussion, brainstorming, logic and reason. You have to experiment and learn your way to greater knowledge and understanding."*

To increase our knowledge, we must perform experiments from which we gain knowledge. Of course, some may say "we can't perform experiments!" If you are that person, try thinking differently. For example, couldn't you say 'hey, can you place it on the fixture like this?' Doing something differently than today is an experiment.

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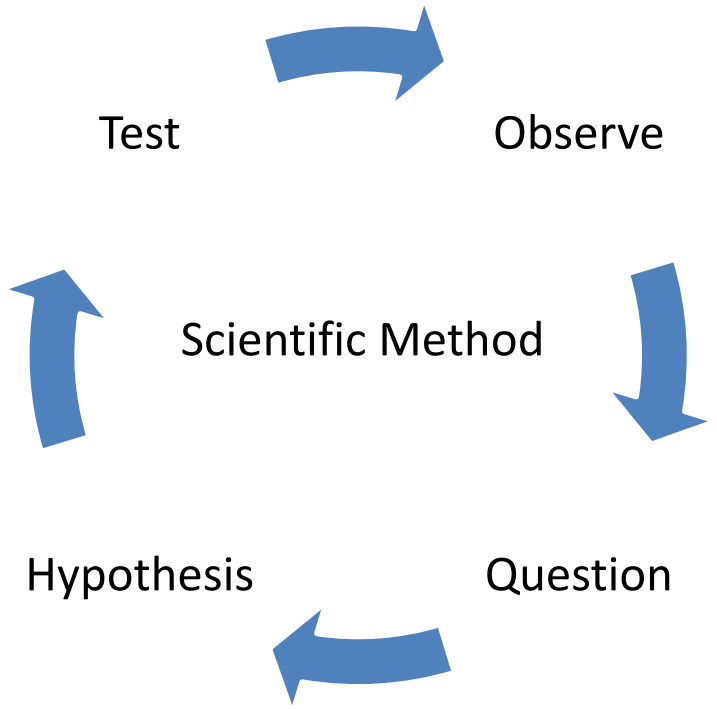
Experiment

Many of us use the Scientific Method without realizing it. We observe a problem, question why it occurs, propose an explanation based on limited information (Hypothesis) and test our assumption.

This sounds very similar to a process called the PDCA cycle, have you heard of it?



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Method

1. Define the problem
2. The team facilitator asks why the problem occurred and records the team's response
3. To determine if the response is the root cause of the problem, the facilitator asks the team to consider “If the most recent response were corrected, is it likely the problem would recur?” If the answer is yes, the response is likely a contributing factor, not a root cause
4. If the answer provided is a contributing factor to the problem, the team keeps asking “Why?” until there is agreement from the team that the root cause has been identified
5. It often takes three to five whys, but it can take more than five, so keep going until the team agrees the root cause has been identified

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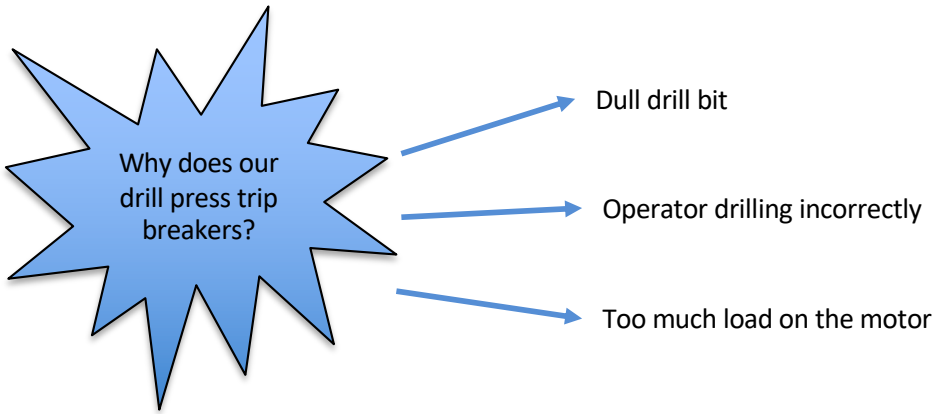
Example Problem

One of our drill presses trips a breaker when used. We have multiple drill presses of the same model that do not trip breakers.



What is our first experiment?

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Example Problem

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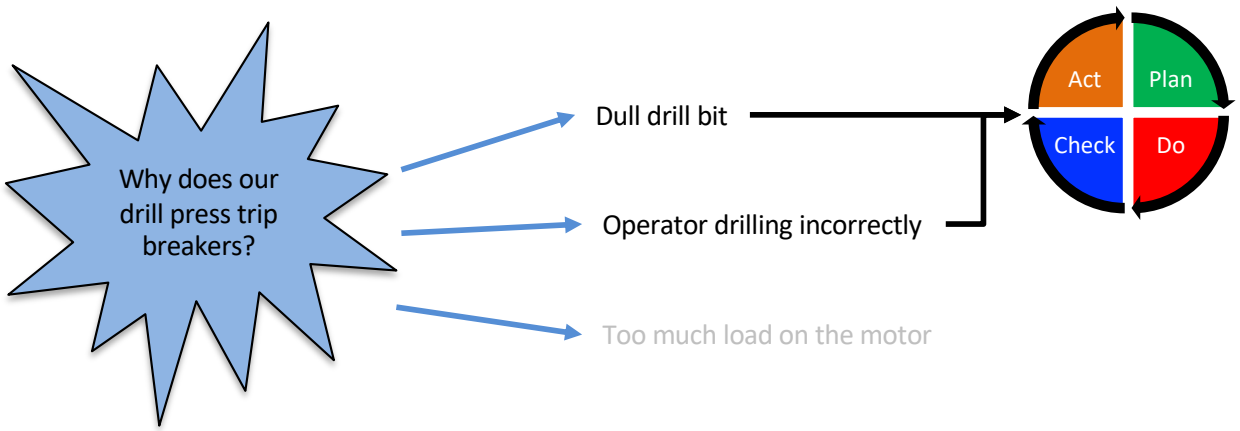

Plan
Verify drilling procedure and use a dull drill on the machine in question and when the breaker trips, move the drill to a different drill press and repeat exercise

Do-Check
Performed the above-mentioned experiment and the alternate machine did not trip a breaker

Act (on what we learned)
We learned our method and drills were not the problem, but something is placing a load on the motor that does trip the breaker.

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Example Problem

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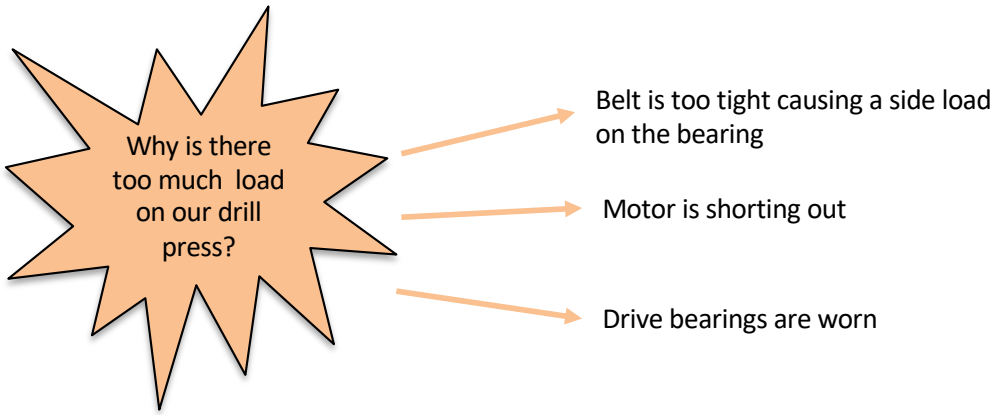

What is our second experiment?

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Example Problem

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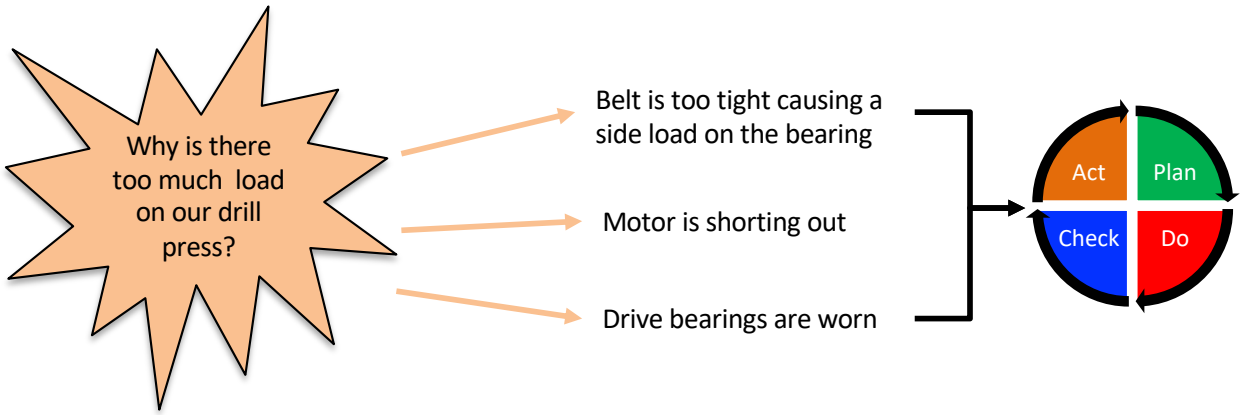

Plan

- Verify the belts are tightened to the recommended specifications
- Test the motor for shorts
- Inspect bearings for wear

Do-Check

Performed the above-mentioned activities

Act (on what we learned)

- Belt is tightened correctly
- Motor meets specifications and no arc points were observed
- Bearings display aggressive wear

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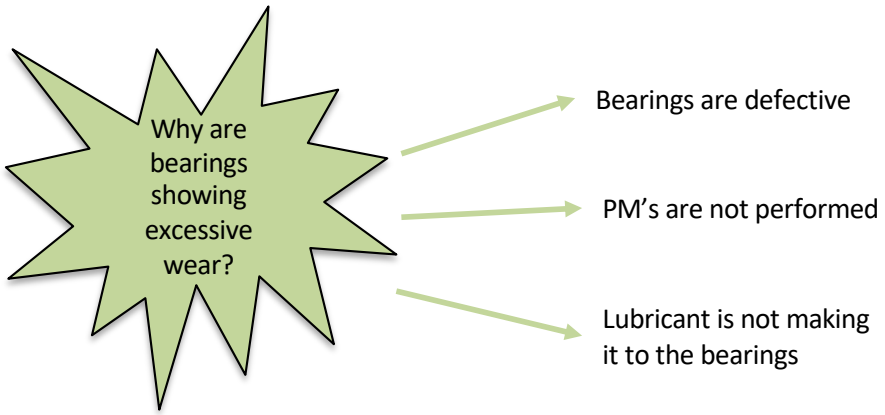

What is our third experiment?

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Example Problem

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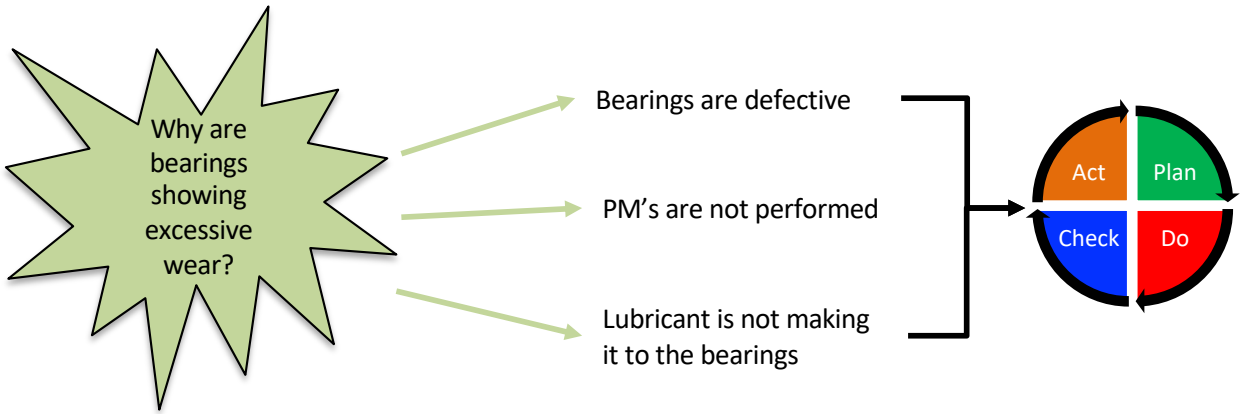

Plan

- Verify CoC of bearings
- Verify PM's are being completed
- Measure the flowrate of the lubricant

Do-Check

Performed the above-mentioned activities

Act (on what we learned)

- Bearing CoC's show bearings are compliant
- Verified PM's are performed
- Observed lubricant flowrate is less than specification

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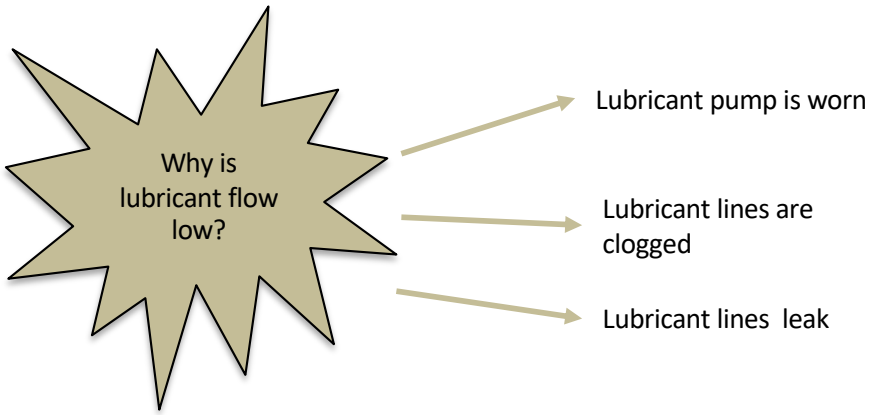

What is our fourth experiment?

Example Problem

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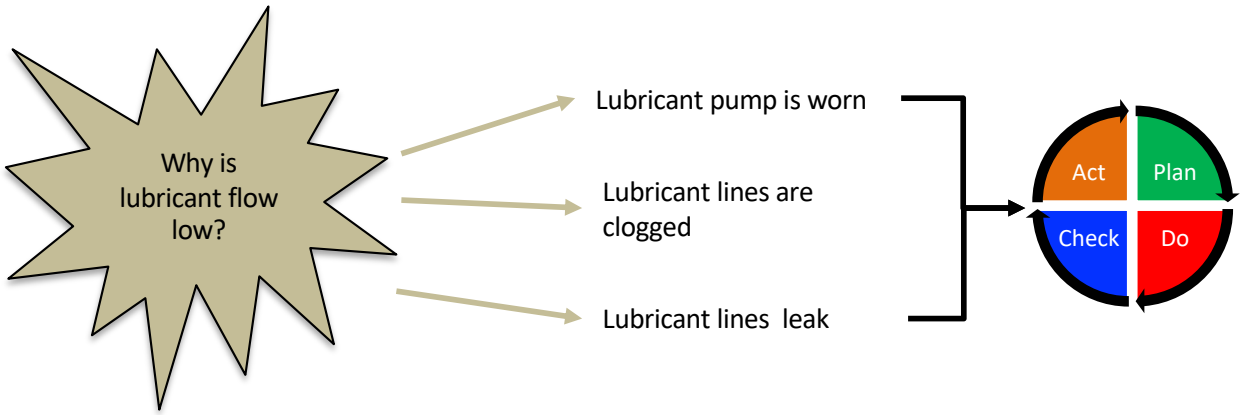

Plan
- Inspect the pump for wear
- Inspect the lines for clogs & leaks

Do-Check
Performed the above-mentioned activities

Act (on what we learned)
Inspection of the pump shows excessive wear on the impeller which decreases the system pressure

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Example Problem

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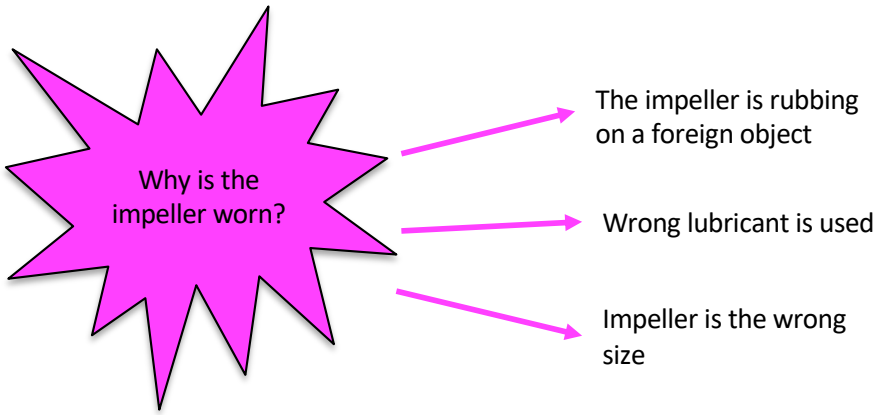

What is our fifth experiment?

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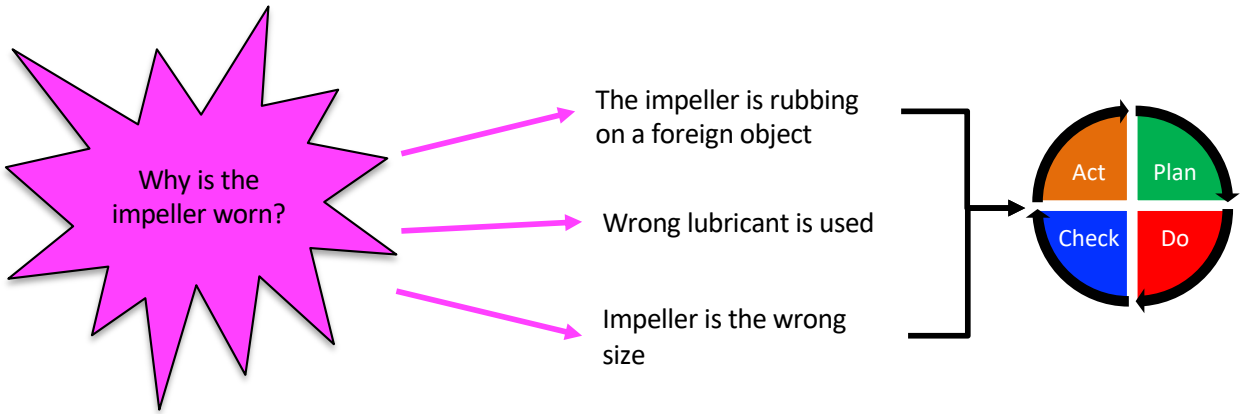

Plan

- Remove the impeller and inspect for rubbing
- Verify the correct impeller is installed
- Verify the correct lubricant is used

Do-Check

Performed the above-mentioned activities

Act (on what we learned)

Verified the correct impeller and lubricant is used however, we found metal chips in the impeller housing which wore the edges of the impeller

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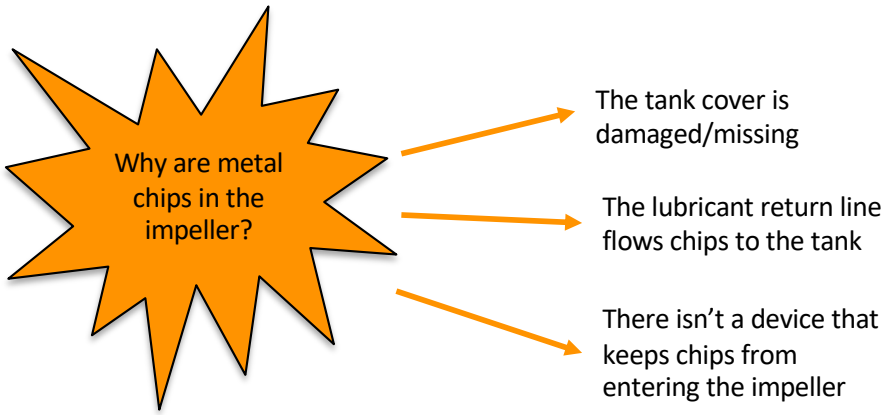

What is our sixth experiment?

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Example Problem

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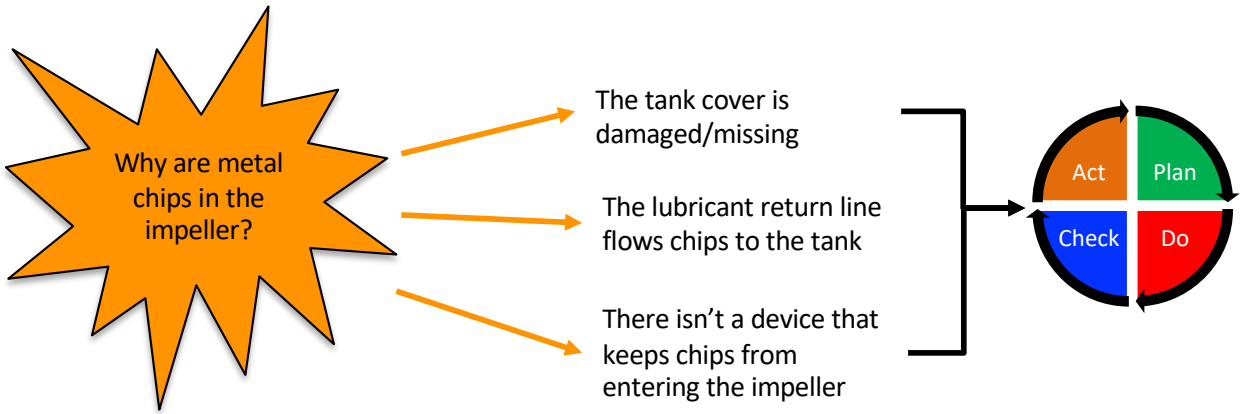

Plan

- Inspect the tank cover
- Learn about the flow of lubricant through the machine

Do-Check

Performed the above-mentioned activities

Act (on what we learned)

The tank cover is working as designed. The lubricant flow passes lubricant into the cutting area washing the chips out of the cutting path and returning them to the tank. There is no 'strainer' that stops chips from entering the impeller

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Root of Problem

Findings

The machine is functioning as designed. The issue is the design of the tube feeding the pump. This tube does not have a strainer allowing chips as large as the inner diameter of the tube to flow into the impeller causing the excessive wear.

Corrections

- A strainer was attached to the inlet tube stopping the chips from entering the impeller
- The tube was raised off of the bottom of the tank to avoid the chips that settled into the bed of the tank
- A weekly PM schedule was added to inspect and clean the strainer

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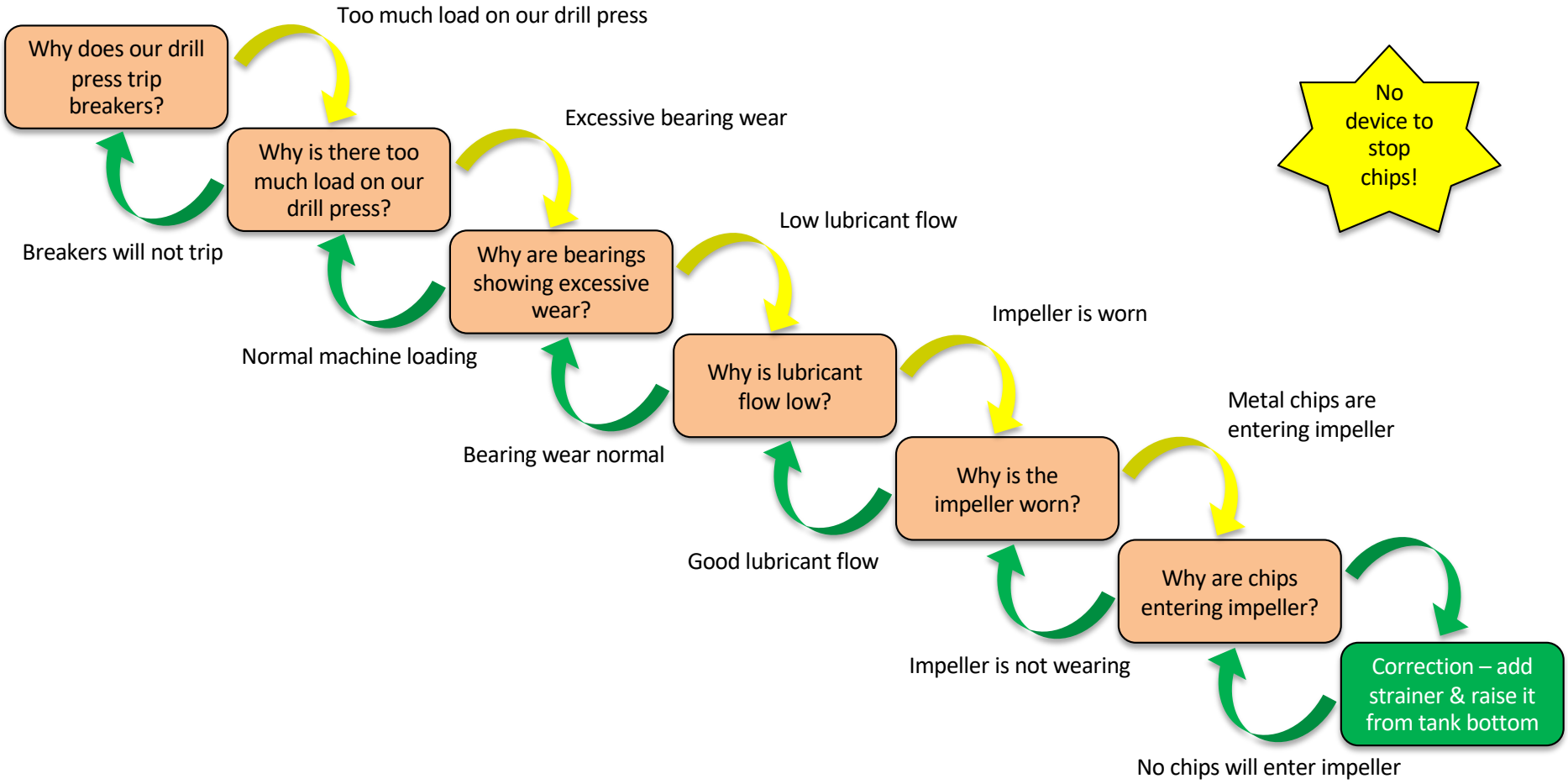

Root of Problem

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Tips

- If this method does not solve your problem, you may need companion tools to help point you in the right direction
- It is important to have the right people on the team, people from the associated process must be involved in order to dig down to the correct root cause
- If the team uses answer that include “I think…” or “I guess…” then the team is ‘stuck’ and may need companion tools to ‘un-stick’ themselves
- Once a correction is implemented, you want to look at similar processes to see if this can improve those processes too

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Companion Tools

- Fishbone and Affinity diagrams are common tools used for root cause analysis
- An Affinity diagram can organize the team's ideas which will develop the 'headers' and 'inputs' of a fishbone diagram
- The fishbone diagram will allow the team to prioritize the most likely answer (input) to a 'stuck' Why
- Once the inputs are prioritized, the team can develop their experiment to prove out the 'stuck' Why, which in turn could lead to the root cause or the next Why
- Include people with personal knowledge of the processes and systems involved in the problem being discussed

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