
# *Inspired* Blended Learning™ Case Study

## Pharmaceutical Facility

## Reliability Improvement Project

**Version 1.0**

Where Education Meets Application.

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# INSPIRED BLENDED LEARNING™ CASE STUDY

## STRATEGIC ALIGNMENT OF OPERATIONAL RELIABILITY

When I first started on this journey to improve Loader Reliability, I had several areas of interest. The areas of interest were premature failures, lack of knowledge, and improper Root Cause Analysis (RCA). I took all of this into consideration when trying to make the loaders more reliable. Another task I had to focus on was leading the Reliability Engineering team here at Pharmaceutical Company X and establish Criticality, FMEA, Hierarchy, RCA, PDM technologies, and failure modes; all in which helped me with my Loader reliability project. Ultimately in Reliability everything has to work together in order to be successful. If you have one without the other you will fail.

## IMPROVEMENT PROCESS

The first thing that I looked at when starting my project was a true RCA process on premature failures. I assembled a team and we called this team the Loader Rapid Action Team. The team started out just trying to take care of small failures and get quick fixes for an "easy win". I was receiving daily reports for the truck loaders from our Computerized Maintenance Management System (CMMS), and I noticed that we were breaking a lot of chain dogs, lift jaws, and love joys. I knew there had to be an underlying issue causing all of these failures. Until this

 

point we never had a true RCA process, we only had the basic *5 whys process*. This process is great for getting you thinking in the right direction down to the physical failure mode; however, it does not get down to the systemic and latent issues. I led my team through a fault tree RCA and started with the chain dog (shown on last page). With the help of my team we were able to work through the RCA and discovered that external force from improperly loading the trucks, improper chain dog size, improper installation of the chain dog, and that the truck PM's were not being completed(Latent issue). The truck PM's were not being completed due to being rushed to get product out the door and some people thought that the PMs were unnecessary and a waste of time. Through this process I found that it was very important to explain to people the reason for completing a task. If you give people direction with no explanation then they will never see the value in the task and it will ultimately not be completed. Right away, we saw that there was a training issue. I presented my case to the leadership team and we held the supervisors accountable for making sure the truck PM's are being completed.

When I started leading the RE, Company X had nothing established as far as criticality, FMEA, and RCA's are concerned. As I mentioned earlier the only RCA process we had was *The 5 Whys* and it was just to get people to start thinking in the right direction. We already had hierarchy and failure modes established in the plant, just with little knowledge about how they worked or how to get to them. The first thing we started on was the criticality tool and then we moved to hierarchy, failure modes, and FMEA process.

 

Knocking out the criticality tool was the first thing we focused on. The reason we gave the criticality tool first priority is because this is a tool that will be used by the planners, stock room, and the Reliability engineers. The criticality tool is what drives your FMEA, RCA, Planning and scheduling, and kitting processes. It is important to understand that the criticality tool gives a ranking of the most critical assets, not telling you which is the most important. All equipment is considered important, especially if that piece of equipment is down at the moment. This is where you have to change your thinking for critical versus important. The tool that we built used a lot of different factors when it came to weighting the assets. We gave all of the impact factors different weights. We aligned the criticality tool with what is important to the Pharmaceutical Company. The factors with their weighting are listed below.

**Safety Impact 30%**

- Injury Potential in event of failure
- Fire/Explosion
- Injury potential during maintenance

**Environmental Imapct 10%**

- Air Emissions
- Chemical Spills

 

**Quality Impact 20%**

- Asset major maintenance required after repair
- Asset Calibration Requirements

**Maintenance Impact 25%**

- MTBF
- MTTR
- Asset maintenance Cost for 1 year

**Operational 15%**

- Asset impact on other areas of plant production

After we had the criticality tool established we touched on the hierarchy and failure codes that are established at Company X already and if it would fulfill our needs as an RE. The problem with any hierarchy is how you set it up to where it makes both the accounting and the Reliability engineering departments happy. It always seems like it is leaning more towards one or the other. The failure modes that we have in our CMMS are suitable for the first phase of using failure modes.

 

After this we started on the wonderful journey for the FMEA process, we decided that we would do the top 5 percent of the most critical assets in the plant. When we created the criticality tool, we ran every asset in our pilot area through the tool which were 321 assets. Out of all of those assets the Automatic Truck Unloaders (ATU) raised to the top as the most critical. We saw this as a "best bang for our buck" when it came to the FMEA process. All of the ATU's are 90% similar in function and components. From one FMEA we will be able to apply the updated maintenance plan, RCA findings, and training to all of the unloaders in packing. The FMEA process is a long process and it takes a lot of work, but the payoff from completing the FMEA is well worth the time!

## RESULTS

We started sending out reports in the middle of the month to let the supervisors know how the lines were doing on truck PM's. We went from about 20% truck PM completion to 100% complete every month!

 

We implemented PM training during this process and started measuring our success. From January 2017 to June 2017, we had accumulated 277.5 hours of downtime on the loaders. Out of that 277.5, 109.62 hours of that was due to broken chain dogs, lift jaws and love joys. Since implementation of our findings from January 2018 to June 2018 we have accumulated a total of 71.99 hours of downtime; and 17 hours of that is due to broken chain dogs, lift jaws, and love joys. From those findings alone, we saved the company $137,986.44!!!! This isn't even what the company sells the product for out the door. This is just the savings in filling alone. All together with the RCA and proper training program we have saved the company a total of $306,171!!!! Below is a line graph showing the EM (Emergency Maintenance) work orders and the amount of Total DT for the month.

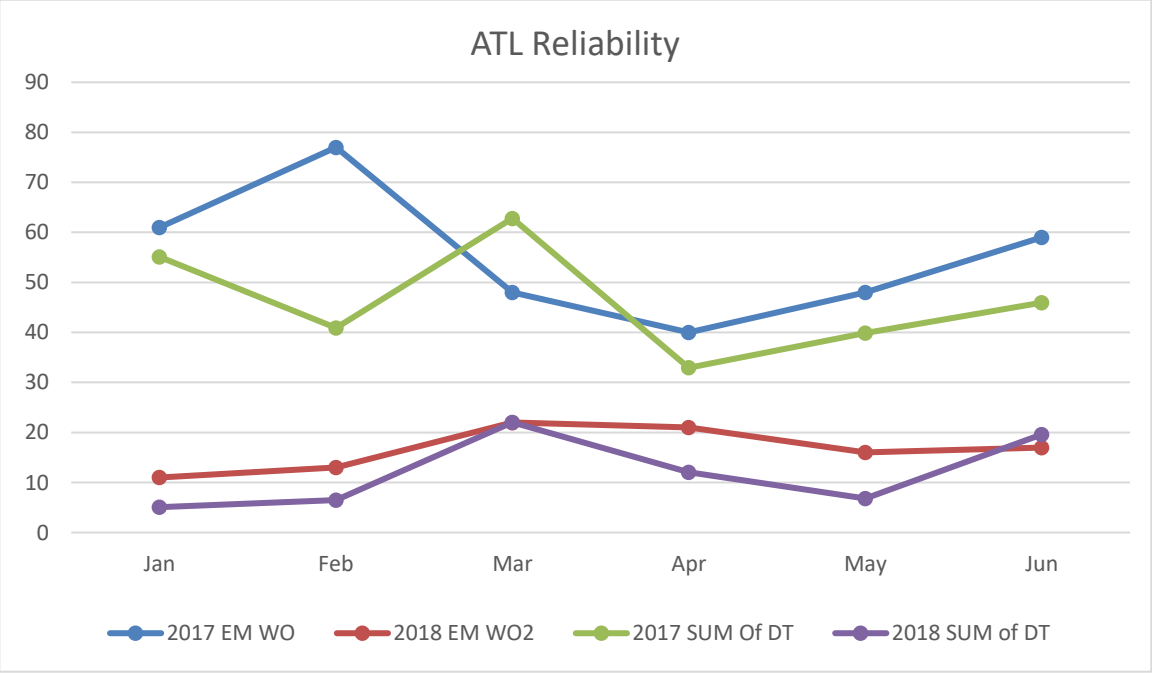


*Figure 1 Emergency Work & Downtime 2017 vs 2018*

 

This is a great example of how a reliability department will increase your output and the uptime of your equipment. When you establish a true RCA process and accountability you will see results. The RCA along with proper training of the handlers has had a direct reflection on the reliability of the loaders. With proper training also comes ownership of the machine. If the handlers have ownership and a great understanding of how the machine should operate then they can notify you before there is a major failure. Operations is always the first line of defense!

## SUSTAINABILITY

Up until this moment training was left up to another handler and it was the "well this is how I was shown to do it" mentality. There was no set standard in place for properly loading trucks. We made a training video of how to properly load the trucks and it will be a part of the operator's yearly training. Through past RCA's the training became a onetime event. The training has never been established to be on going and job related. Making truck PM's and proper truck loading procedures a part of their yearly training ensures that they are always aware of the proper procedures. Once people are aware of the proper procedures, then you can start holding people accountable.

 

Another training program that was put in place was the PT2 (Production Technician level 2) training program. This was set up for the PT2's to spend time with the SME (Subject Matter Expert) of the machines and other courses shown below:

| **Production Technician Training Program - Phase 1** | |
|---|---|
| **Classroom** | **Est. Course Length** |
| Electrical Safety /LOTO | 4 hr |
| Electrical Drawings and Symbols | 2 hr |
| Basic Electrical Components | 1 hr |
| Pneumatic/ Hydraulics Lab | 3 hr |
| 6-S/ Lean / TPM | 2 hr |
| Proxes Photoeyes | 1 hr |
| Maximo | 3 hr |
| DC/AC Electrical Training | 12 hrs |
| Basic Electrical Troubleshooting | 3 hrs |
| **Tech Led Training** | **Est. Course Length** |
| Machine Specific Training | Avg. 2hrs |
| **ISO Train CBT** | |
| Abnormality Identification | |
| Maximo Service Request Training | |

They took the time to come in and learn the order of operations of the ATL's and establish a relationship with the mechanics, technicians, and lead operators. They felt like they had true ownership of the equipment, and it helped them build a relationship to where they felt comfortable asking questions. We have made this a part of the PT2 training program. This is just the beginning of the program and has shown tremendous success. When someone is

 

rewarded the PT2 position they start these training courses. In order to be successful we have to invest in the employees.

## Learning From This Journey

As we continue on this journey to World Class maintenance we will continue to see improvements. Just the improvements that have been made already speak for themselves. Like one of my favorite artists, Andy Mineo says “When your game is loud, you don’t have to talk at all”. Let the tools of reliability and the payoff speak for themselves. It’s a continuous improvement process and if we can continue on this journey then we will continue to be successful!

One thing that was important for me to pass on to everyone else is that we are all one team. We have to work together if we want to be successful!

 

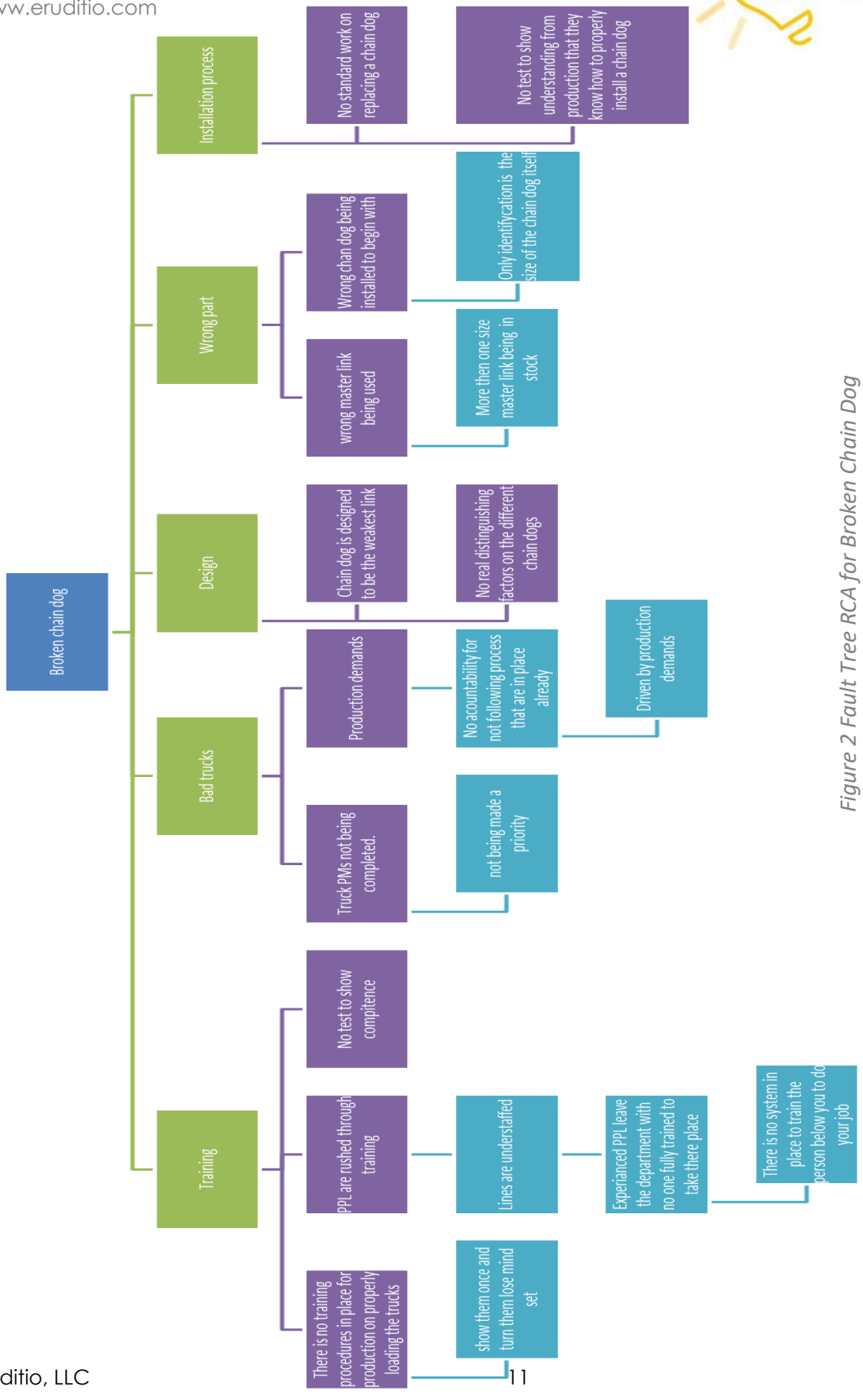


*Figure 2 Fault Tree RCA for Broken Chain Dog*