Failure Mode and Effects Analysis... What, Where, and How?

In last month’s tip of the month I mentioned FMEA’s or Failure Mode and Effect Analysis and promised to give you more insight into what they are and how can we use them in the management of our assets and equipment. FMEA sounds complicated and like some difficult to use government or military program but they are quite simple and easy to use. Although they can be made very complex if you have the need for that level of detail.

In my early years in the manufacturing world we were doing FMEA’s long before they had a fancy name and acronym. We called them potential problem analysis. We would primarily analyze our safety and environmental systems, and ask ourselves what could possibly go wrong which would cause some to be injured. Or when you consider the environmental system what could go wrong that would land me in jail for some major spill or violation.

The simple definition for FMEA’s is to review your critical equipment and ask what could go wrong and then take actions to minimize or eliminate the problem all together.

The basic components of FMEA’s are:

- Defining the basic function of the process or step you are analyzing
- Describe what could go wrong
- Define the potential impact on the process or system
- What is the severity of the problem (score from 1-10) - 10 being severe
- Define the potential causes
- How frequently the failure may or could occur (score from 1-10) - 10 being often
- What methods are used to detect the failure of problem
- How easy is it to detect the problem (score from 1-10) - 10 being difficult or impossible to detect
- You multiply all 3 scores together and that is your RPN (Risk Priority Number)

Your highest score is obviously 1000 which I hope you don’t have any of. If you do do you better start wearing protective clothing as you walk through you facility. Using the Pareto rule 20% of all of your equipment and systems are causing 80% of your problems so using the same theory on the FMEA process your take 20% of your highest scoring RPN’s and begin to develop plans to reduce the RPN so it becomes insignificant. As time goes on you will eliminate all of you major risks and be able to sleep a lot better at night.

Here is a simple FMEA example using tires on a car as the process or system. So let’s consider the tires on our car.

- What is the biggest possible problem? - flat tire
- What is the impact on the process? - car must stop, late to work, raining, accident if it blows
- What is the severity? - it’s a 10 forward progress stops
- What can cause the flat? - 1 option is puncture
- How frequently will it happen? - probably a 2 (not very often)
• How do you detect the problem? - inspect before use, car pulls to one side, control is lost, or excess noise
• How easy is it to detect? - pretty easy, give it a 3
So now your risk priority number is a 60.

If you carry a spare and tools you have now reduced the severity from a 10 to a 4 and now your revised RPM is a 24 (If you would like this in a table format contact Anne and she will send you one).

As you can see the simple solution to the flat tire problem is to always carry a spare tire, jack, and lug wrench. But keep in mind what if the tire is on a police car, fire truck of ambulance? Maybe the solution would be more complex like daily inspection, run flat tires, low pressure detection, etc.

Good luck and enjoy your FMEA’s!