THE UNDERESTIMATED HUMAN FACTOR IN MAINTENANCE

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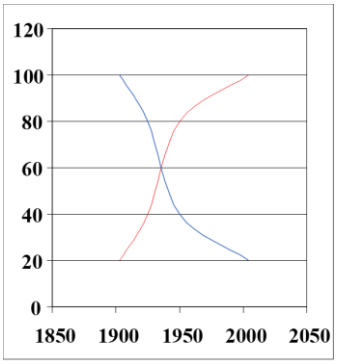
The renowned safety management & safety culture specialist Trevor Kletz once said: '*To say accidents are due to human failing is like saying falls are due to gravity. It is true but it does not help us prevent them*'. We do not want to talk about it, but the human factor is by far the largest cause of failures and incidents. This not only goes for branches like aviation, but also for chemicals, oil & gas, energy and transportation.



Aviation is the area where the last decades a lot of research on human error has been executed in trying to eliminate it. Airline safety has improved over the past 40 years because of better engineered aircraft, better and more strict regulated air traffic control and bad weather prediction. However, in all industries we experience that as systems become more reliable, they also become much more complex. The result is that the human factor begins to contribute to more and more accidents. In the figure the human factor is represented by the red line, the blue line represents machine error[1].

As reported by safety management expert James Reason and others[2], it is estimated that today human error accounts for a majority of most industry accidents. In aviation, 70-80% of the accidents is due to human error, nuclear power 70% and road transportation 85%. Those accidents are not only caused by human mistakes by operators or users, but surprisingly also by human error in maintenance. Investigation shows that approximately 12% of all aviation accidents are caused by a maintenance factor. At coal-fired power stations, 56% of forced outages happen within a week after a planned or maintenance shutdown. A power distribution company reported that on average between 50 and 60% of all failures are related to a maintenance error[3]. And aviation industry studies have found that the origin of as many as 20% of all in-flight shutdowns can be traced to maintenance error[4].

Because we are heavily dependent on complex modern technologies with high speed and large power and volumes, maintenance errors can have serious consequences in terms of safety, environmental issues, downtime and costs. Considering the numbers and consequences, maintenance errors should be treated as a business risk.

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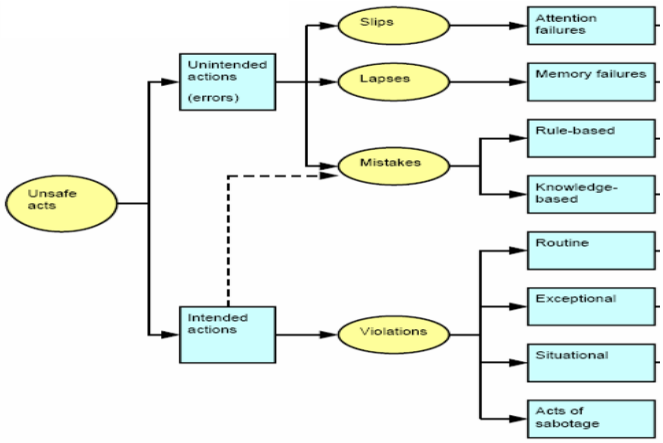
[1] Alabama & Northwest Florida Flight Standards District Office
[2] Managing Maintenance error: a practical guide, James Reason and Alan Hobbs, CRC Press 2003
[3] M. van Pijlen, Hogeschool Utrecht 2015
[4] Jorge Leite, TAP

Maintenance errors are often unsafe acts. Like not using technical documentation, perform a task based on previous experience without using appropriate documentation or actual documentation. Or being distracted when performing a maintenance action or speeding, because of a high workload. Or simply forget things. Some errors are unintended and are slips, lapses or mistakes. Other errors are violations, like deliberately executed shortcuts or not using a procedure to save time. See figure (source ABB).



We cannot eliminate the risk of maintenance error completely, but we can manage it more effectively.

What is helping tremendously is to understand why people make mistakes, not only in executing a maintenance job, but also in planning & preparing the job, in writing the maintenance manual and in engineering the asset. By applying methodologies like a Failure Mode Effect & Criticality Analysis (FMECA), Risk Based Maintenance (RBM) and a Hazard and Operability Study (HAZOP), we analyse potential failures and possible causes of failure already in our engineering process, in order to prevent them by making other engineering choices. We can learn of maintenance errors by analysing technical failures and incidents in a structured way, for instance by applying Root Cause Analysis (RCA) or similar methodologies. And there will be a role for management too. Managing the person, the task and the team, the workplace and the organization firm but fair and by creating a safety culture, we can bring down the number of maintenance errors.

Accidents don't normally appear out of the blue. They are the result of a culture that supports unsafe behavior[5]. We can conclude that reducing the amount of unsafe acts (or errors) will lead to a reduction of accidents and fatal accidents.

*The training **'Maintenance Errors - Understanding, identifying and managing the human factor in maintenance errors'** will highlight the human error in maintenance, the fundamentals of human performance (psychology meets engineering & maintenance) and basic methodologies to analyse and prevent maintenance errors.*

Some benefits in attending this course:

- *Have a comprehensive understanding of the impact of maintenance error on the organization (risk), the workplace, the worker and the bottom line of the company*
- *Learn fast how other companies are identifying and understanding the human factor in maintenance error*
- *Know how to manage maintenance error more effectively*
- *Gain insight in common pitfalls and key success factors*
- *Be able to apply instruments to implement maintenance error management in both short as well as long term*

Want to know more? Get into touch via the IES office. See our website www.iesbv.nl for more information

[5] Heinrich, H.W., Petersen, D.& Roos, N. (1980), Industry Accident Prevention: A Safety Management Approach. (5th ed.) New York: McGraw-Hill