

## Fire Safety: A Preventive Approach

Every time, I read or hear news about a fire accident particularly in a paper mill, I wonder why adequate research has not been done to avoid such fire accidents for paper mills. Today, we know a lot about paper, its composition, physical and chemical properties and microstructure etc. But, have we really studied enough about fire-catching properties of paper?

An earlier publication by me last year, raised the issue of fire accidents in paper mills and emphasized the need of further research on following points-

- Combustion rates of paper under increased humidity**
- Effect of moisture on combustion of paper**

That publication is available on Slideshare. Here, I'd like to present how one can plan an action line for the research on this topic.

Ref: <https://www.slideshare.net/deveshksinghal1/firesafety-144578213>

The first part is the fire initiation. We need to know and understand how the stored paper and waste paper catches fire sometimes even without an active flame present in nearby areas.

Have you noticed that in several cases, the fire accidents have been reported in open waste paper yards where there was no electric supply was available, which could have resulted in a spark initiating fire? So, why did the fire start? That indicates that some unknown heat source might be behind such cases. An obvious culprit might be some remote heat source supplying heat through radiation. Radiant heat is often invisible. Here, we need to know-

Can radiation be used to initiate to initiate a flame? If yes,  
How does the radiation behave on different types and grades of paper?  
What preventive approaches may be used to avoid accidents due to this?

For the same, a small test tower can be made; maybe of glass, where different grades of paper strips can be suspended from top. At one side of it, towards the bottom, there is an IR lamp with a magnifying glass, mounted in such a way that the heat can be supplied in form of IR radiation to a particular spot on paper strip. At the bottom of the tower, there is also a provision to supply air of controlled humidity to pre-condition the sample of paper in a short span of time. Obviously, there must be some flue gases escape from the top of the tower.

Now, a strip of paper is mounted from the top, it is conditioned for a pre-determined time using the air with desired humidity, and after the same has been conditioned properly, air supply is stopped. Now the IR lamp is switched ON. The time to initiate fire and time to reach flame to top are noted down.

The delay in initiation of fire indicates that the heat required to initiate the fire is high and vice versa. The experiment may further be improved with different levels of IR Radiation, different grades of paper, different levels of moisture in paper etc.

Obviously, along with a lot of information, one would get results like high humidity results in delay in flame initiation. One might also find that after a certain humidity level, it is virtually impossible to initiate a flame with a low power heat source.

Now, the issue is- Can we maintain that humidity level in nearby atmosphere? Can we maintain that particular moisture level in paper which acts as a retardant to fire?

In most mills, waste paper stock is spread in different yards, sometimes in open yards, sometimes with a shed, and sometimes properly covered. The issue is- Can we increase moisture in waste paper, or can we increase ambient humidity at least in the areas nearing waste paper storage?

Many mills use water spray over the waste paper in summer season. However, most paper professionals fear of degradation in paper quality due to repeatedly wetting and drying of paper. Mills using white grades of raw materials find the brightness reductions while the kraft based mills observe reduction in strength of paper due to frequent water spraying on waste paper stock.

Well, in such cases, the use of misting system could be a potential solution. Misting can be done over the waste paper, and alternatively on the adjacent areas which would do reduce the ambient temperature in the vicinity of waste paper, as well as over a period of time, the moisture content of paper will go up.

A few photographs of the misting system are being included here to have an idea-



Misting for our luxury & comfort? Can it also be used to save waste paper from fire?



Stop fuming, keep your mind and waste paper lots cool with misting!



Mild fogging, possibly great results!

As obvious, this type of misting can lower down the ambient temperature significantly, without affecting the quality of waste paper adversely. Not only this, one may consider to use treated effluent for misting purpose, thus reducing the quantity of treated effluent discharged.

Looking for a **No fire accident** time for all paper mills!

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