

Translation to Indian Conditions: Design Axioms For Easier Maintenance

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ABSTRACT

Strategic Maintenance as apart from Planned Maintenance is mainly intended to forsee and face antanogistic forces. In this compilation we are mostly dealing with environmental and other factors which are special to our country. Now-a-days we all prepare to face power cuts in summer due to which we spruce our boilers, our generation equipments etc., by March every year and in July more particularly in the Peninsula to take care of the high turbidity when we draw water from the river. Such a list of major and minor items is given.

INTRODUCTION

When we were taking a foreign consultant around a big paper mill, there was a GI. rain cover on the out-door motor of the plant. He asked us what this was for. We explained to him that it is to prevent rain splash. It is louvred and over-sized to let in air also. Further we mentioned to him that high temperature and in Peninsular India high humidity cause certain problems. This list is the outcome of that discussion which is not complete but can be a basis for further development, even though some of them may appear obvious.

The above is a simple and supreme example of strategic maintenance, e.g. how many out-door motors are there, of what size and naturally the cost involved etc.

Besides, at the time of designing the project itself, they need to be taken care of.

WATER

Except in the very North, in the monsoon-unlike snow molten rivers or lakes, the Indian rivers are mostly rain-fed. Considerable erosion of the river banks takes place due to rain in season. So, the rain water in these periods is of high turbidity requiring considerable treatment before use in paper mills. Water treatment plants have to be designed for highest level of turbidity. Demineralising plants are becoming increasingly necessary.

CHEMICALS

The shelf-life of chemicals, particularly under

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high humidity and high ambient temperatures is low and the nature of packing is different. As in Pharmaceuticals, storage in a cool and dry place is warranted.

BOILER DESIGNS

Excepting in certain locations again, only low calorific value coal or coal of varying quality is mostly available and it is preferable to design the boilers for low calorific value coal or retro-fit them for efficient fluidised bed ones. This also reduces to some extent, air pollution.

In future, all coal boilers will be F.B.C. Design variants, with proper design for disposal of high ash.

DIRECTIONAL LOCATION

It is preferable to locate the building longitudinally East-West, instead of the North-South, where the impact of the sun will be along the longitudinal structure.

WIND DIRECTION

It is getting less critical nowadays with tall chimneys and good pollution control.

In Peninsular India, the coastal areas, the wind directions are mostly in the monsoon directions except where hill features affect them.

BUILDINGS

In cooler climes, the buildings are totally enclosed with heated air, which are not required in most places in India. So, it is not necessary or possible to have any heating systems and this makes available, an excess of warm to hot water for which an alternative use has to be found in most mills.

The roof of the Indian paper machine buildings is generally designed with slopes for rain flow-out (unlike foreign buildings which have almost plain horizontal roofs.) Their buildings are enclosed and air-conditioned.

Some buildings in India have a 'cap' roof for ventilation with side meshes.

In Bleach plants, concrete in place of beams are used for roof support.

DUST

Indian paper buildings, being semi-open, enable dust blowing in.

In summer, more particularly, a lot of dust is raised because of drying of earth surfaces and this specially necessitates periodical cleaning.

LIGHTNING CONDUCTORS

Lightning conductors should be fixed over the building as soon as the maximum height is reached as the frequency of lightning is high in the monsoons.

STORM DRAINS

Due to occasional heavy rains, traditionally designed drains will over-flow as they will not take the shock of sudden downpours. It is preferable to have, after long lengths of drains and at corners, small shock absorbing dumps to even out the flow.

Designing a drain map with proper contours almost simultaneously with the initial plant lay-out is necessary. It will help also during construction, by prevention of flooding within the plant building area.

HUMIDITY

Except in certain arid and in-land areas, there is prevalence of fairly high humidity combined with high temperature which causes condensation problems and in our semi-open buildings, this requires the designing of dehumidified heating systems where required.

DRIPPING FROM THE ROOF

Due to openness of buildings and difference in temperature between the top and bottom of the roof, particularly when it rains, Dripping from the roof requires an auxiliary roof (particularly over the paper machine area) with air injection and wet air drawal in many cases.

There is also need for special man-coolers at appropriate places where heat and humidity are prone to be high.

COMPRESSED AIR

In the case of compressed air, there is

condensation of moisture in the pipes.

Dryers are a must in order to keep the air moisture-free.

VACUUM SYSTEM

Vacuum systems have to take care of more condensation. This needs to be considered in the fixing of vacuum pumps and water separators.

INSECTS

In the rainy season, there is a need to ward off insects with special lighting and other provisions particularly in the paper machine area.

MOTORS

- (a) Due to high ambient temperatures, there is need for derating of motors, particularly in the smaller sizes.
- (b) Our frequency is 50 cycles while North America has 60 cycles.
- (c) **Air-Conditioning** Certain motors require continuous induction of cold dry air. Certain panels require air-conditioning, particularly Thyristor.
- (d) Instrument panels need to be pressurised to prevent them from fumes and dust. In flanged mounted

motors and in enclosed spaces, the higher frame sizes are a problem in mounting.

- (e) Out-door and semi-out-door, where subjected to water splash, motors of TEFC types are mostly preferred. Rain covers for motors are invariably necessary.
- (f) Besides, voltage considerations are always there, to be taken care of.

CONCLUSION

It has been suggested that though axiomatic, certain examples facilitating strategic maintenance be listed.

We have to de-rate our smaller motors as compared with Western levels of design to counteract our hot temperatures.

In case of our buildings we suggest that all paper machine buildings should be located longitudinally East to West to reduce the impact of the Sun.

We have to pressurise instrument panels in dusty areas because of the semi-open nature of our buildings.

These are of particular importance to Foreign Suppliers and Designers.

Such matters require to be periodically discussed.