

# **USE OF VENTILATION SYSTEM DURING ALUMINA CLEANING OF TURBINE COMPONENTS DURING OVERHAULING - ENVIRONMENT BETTERMENT**

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## **ABSTRACT**

At NTPC Dadri Stage-I Turbines (4X210MW) & Stage - II ( 2 X 490 MW) are of KWU make. Alumina grit blasting is used to clean the turbine components during overhauling to prepare the components for non-destructive testing in temporary enclosure. During above said process the environment inside & outside the temporary enclosure becomes very- 2 dusty and health hazard for the Cleaning experts and also affect running equipments of adjacent units. This paper deals with how we can improve the working environment for the cleaning expert and the outside environment.

## **INTRODUCTION**

In Power plant, these days, Abrasive (Alumina/ sand) blast cleaning is employed during overhauling for removal of deposits and scale from Blades, stationery vanes/blades/Diaphragms and steam path of rotor/casing. Cleaning turbine blades and components is a critical part of inspection for faults and defects and their remedy – depends on the result it delivers. This is why both operational impurities like rust or accumulated deposits, and functional coatings like ceramics or adhesive layers need to be removed safely and reliably in order to reveal all possible defects in the underlying part. Removing scale and deposits from the turbine components by means of grit blasting, prepares the unit for non-destructive testing purposes and allows the turbine to return to optimum efficiency.

## **FUNCTION & WORKING OF GRIT BLASTING SYSTEM**

Abrasive blasting is the operation of forcibly propelling a stream of abrasive material against a surface under high pressure to smooth the rough surface or remove surface contaminants. A pressurized fluid, typically compressed air is used to propel the blasting material (alumina or sand). During cleaning 90/220 grit size of Alumina i.e. very fine particles are impinged manually with the help of nozzle and compressed air, inside the Temporary enclosure.

## **PROBLEM FACED**

During the process the environment inside & outside the temporary enclosure becomes very- 2 dusty and hazardous for the Cleaning experts.

Dust particles vary in size from visible to invisible. The smaller the particle, the longer it stays in the air and the further it can travel. Large dust particles tend to be trapped in the nose and mouth when someone breathe them in and can be readily breathed out or swallowed harmlessly. Smaller or fine dust particles are invisible. Fine dust particles are more likely to penetrate deeply into the lungs while ultra fine particles can be absorbed directly into the blood stream.

The type and size of a dust particle determines the level of toxicity. However the possible harm the dust may cause to your health is mostly determined by the amount of dust present in the air and how long you have been exposed to it.

Dust particles small enough to be inhaled may cause:

- irritation of the eyes
- coughing
- sneezing
- hay fever
- asthma attacks.

For people with respiratory conditions like asthma, chronic obstructive airways disease (COAD) or emphysema even small increases in dust concentration can make their symptoms worse.

The hazy environment due to the suspended dust particles causes delay in inspection of the equipment surface, which increases the process (cleaning) time.



Photo-1 Actual Site Photograph during Alumina blasting with conventional method

## **RESOLUTION OF PROBLEM**

It was thought to improvise the process for improving the working environment for the cleaning expert and the outside environment by employing a suitable air supply and exhaust system, during the forthcoming Turbine overhaul. Dadri station fabricated the dismantlable permanent structure fitted with door and Removable roof segments (Photo-2).

## **WORKING OF IMPROVISED SYSTEM**

Air conditioning system was used for supply of clean cold air at two places (Photo-2) and four number of air extraction blowers were installed for extraction of dusty air from sides and roof top (Photo-3). The exhaust end of the hoses were taken outside the building and were terminated into the drums filled with water, so that Alumina gets captured in water as alumina having high affinity towards water.



Photo-2 Air conditioning system supplying fresh cold air to enclosure



Photo-3 Hoses with air extraction blowers



Photo-4 Actual Site Photograph during Alumina blasting with improvised system

## **RESULTS**

- As seen from the door (Photo-4), the inside cleaning environment has improved drastically.
- Inspection time reduced as we can see / inspect components during cleaning process.
- The cleaning crew was very happy.
- Outside environment was also unaffected by the dust.
- Increase in productivity as the person engaged can work more efficiently.
- This system protects the surrounding area and equipment from any contamination. It also allows work to continue in adjacent areas.

## **CONCLUSION**

The improvised process employed at Dadri during In-House Turbine Overhauling has been found very effective for betterment of environment, health & equipment.