

Steam turbine disruption in an bio mass burning power plant (India)

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The plant is a valid Clean Development Mechanism project. This means that when it produces electricity, the power plant will also earn carbon credits (CERs) that can be sold to buyers who have emissions reductions targets. Thus, revenue of the plant is from sale of power as well as of carbon credits.

The power plants turbine is a 7.5 MW unit installed in 2004, normally operating at 7,500 PRM with a reduction gearbox between turbine and generator.

On 22.07.2009, following certain problems in grid operation, the power purchaser instructed the Insured to de-synchronise the plant. The TG operator subsequently reduced the load gradually from 6.5 MW to about 1 MW (internal load to cater to auxiliaries) from 11:40:12 hrs. to 11:49:12 hrs and then the generator breaker was opened.

After the generator breaker was opened, the turbine speed increased within a few seconds. At this speed the turbine tripped on high speed and simultaneously the operator tried to activate emergency stops. Suddenly turbine got ripped apart and broken pieces of the TG set components flew off with tremendous speed. The rotor shaft sheared near rear the journal pedestals and few pieces flew through the TG hall roof along with pieces of the high speed coupling, coupling guard etc. Broken pieces also damaged the Generator relay panel.

Fire erupted in the front and rear bearing pedestal, but was extinguished before it spread beyond the bearing pedestals.

Extent of Damage (see photographs attached):

Turbine & Gearbox, High speed coupling & Condenser	} damaged beyond repair and requiring replacement
Generator & Low Speed coupling	No significant damages
Generator relay panel	Relays and instruments damaged
Buildings	Walls, windows and roof of TG building damaged.

History of plant:

A sister TG set originally installed at another plant of the insured was replaced by Siemens due to deficiency in its performance. Thus the initially erected turbine became redundant and was kept in the insured's store.

During a planned annual shutdown in August 2008 at Insured's plant, an abnormality was noticed in the turbine rotor (crack in the first stage disc).

For replacement of the rotor the rotor from the spare turbine was taken out, sent to a non-OEM workshop, for dimensional checks and balancing and then installed in place of the broken one, then commissioned and put into operation.

At such stage the turbine was proposed for MB and MLoP insurance. The above critical fact of using an old rotor from another machine for erection and commissioning of the turbine was never revealed to Insurers.

The amounts claimed by the Insured were:

Material Damage: US \$ 20,000,000

Business Interruption: US \$ 20,000,000

When the loss had occurred, the following issues crop up:

1. The old, defective rotor that was lying idle was not the property of Insured. Despite written requests, Insured never clarified as to who owned the rotor which was lying idle.
2. Insured had installed this rotor without manufacturer's prior consent and review despite knowing the fact that the turbine was defective.
3. Insured did not reveal to Insurers the background of this rotor and its installation prior to inception of cover. It is difficult to assume that any independent risk engineer could have detected this fact merely by inspection or asking questions on operations of the machine. This fact could have become known only when voluntarily revealed.
4. It is quite logical that the engineering/technical ability of the non-OEM agency without the knowledge of design and manufacturing data of a machine can never match the ability of an OEM who has the full background & data.
5. It is critical to question if the undisclosed facts were **“material to the risk”** or **“material to the cause of loss”**.
6. Can insurers deny honouring the claim? Is the policy void do to concealed facts of risk when the policy was underwritten?

The provider of this contribution leaves these questions open for the reader to discuss and find his own answer considering legal circumstances applicable in his view.



Rear bearing pedestal and coupling area



Turbine rotor shaft broken near journal



Damaged casing, gears and shafts