Sudden Fluid Coupling Failure

WHAT HAPPENED

Whilst operating an inching drive (barring drive) on a cement mill, an out of balance load resulted in the mill unexpectedly turning in the reverse direction. Three employees who were in close proximity retreated to a nearby stairwell when they realised that a problem was occurring. A failure resulted in fragments of the drive being ejected at speed. No injuries were sustained.

The cement mill contains 380 tonnes of steel balls. Some months ago an additional manually operated water lance was installed to further improve the mill temperature control. The existing cooling water lances are all automatically controlled.

The mill was shutdown on the day prior to the incident and a verbal request made for the water feed to be turned off. The following day water was seen coming from the cement mill outlet – the mill now had a mix of water, cement and grinding media within it. A decision was made to turn the mill using the barring drive to break up the accumulated material.

Shortly after commencing the inching operation the barring drive was stopped due to excessive load. Unfortunately the automatic shaft brake failed to hold the weight of the out of balance load causing the mill to drive the gearbox and fluid coupling in reverse. The gearing resulted in the coupling going in to over-speed and a loud “whooshing” sound was heard from the fluid coupling immediately prior to failure.



Cement mill with barring drive platform



Remains of fluid coupling after failure

LEARNING POINTS / ACTIONS TAKEN

Immediate cause - An uncontrolled reversal of the mill resulting in excessive pressure due to overspeed within the fluid coupling.

Root Cause – The operation of the manual cooling water lance had not been adequately assessed when the modification was made. – Management of change.

Actions:
- Develop and implement a straightforward and practical management of change procedure.

- Review and “HAZOP” study other similar installations where fluid couplings are installed in the drive train. Consider installing alternative drive arrangements (e.g. soft starts, inverters) and review the position of controls in relation to drive trains.

External investigation indicates that this type of failure of fluid drives is rare, but has been seen previously – inclined belt conveyors and bucket elevator conveyors are particularly vulnerable

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LOCATION:	**CEMENT PLANT**	**ALERT STATUS:**	**Normal**
ACTIVITY:	**MAINTENANCE & HOUSEKEEPING**	**DATE ISSUED:**	**03/09/2012**
SUB ACTIVITY:	**N/A**	**INCIDENT No:**	**00337**