

MATTHEWS INTEGRITY HUB

FAILURE BRIEFING

CATASTROPHIC FAILURE OF CRANE DISC BRAKE

INCORRECT MAINTENANCE/INSPECTION

THE ARRANGEMENT

The overhead crane hoist on a power plant was fitted with an electrical eddy current brake and a disc brake as a back-up. The disc brake is operated by 50mm long springs pressing twin rotating discs against static plates. To maintain braking efficiency the assembly require adjustment as the disc pads wear . Wear is checked by inserting a feeler gauge through an access hole. The adjustment is performed by tightening the threaded adjustment ring (see photo) which slides the rotating discs along a splined shaft, taking up the clearance between the discs and their static plates .

THE FAILURE

During lowering of the 125 tonne turbine rotor during outage the eddy current brake did not operate correctly due to an electrical fault, placing reliance on the disc brake to stop the load. The disc brake operated but the discs slipped and shattered ,causing the rotor to continue falling and hitting the floor, suffering irreparable damage.

THE CONSEQUENCES

Fortunately no-one was injured but there was a large loss of revenue for a replacement rotor and lost generation costs.

WHAT WAS THE CAUSE?

Crane disc brakes are sized and tested to work under 125% SWL overload conditions and are only used for full-load lifting during annual outages. They are also subject to periodic inspections under the LOLER regulations. So why did this one fail? See next page for : **Failure Diagnosis and Lessons learned**



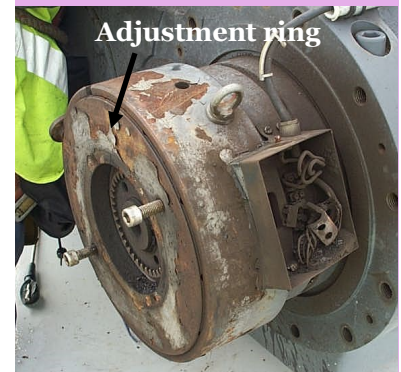
HEAD OFFICE



The overhead crane

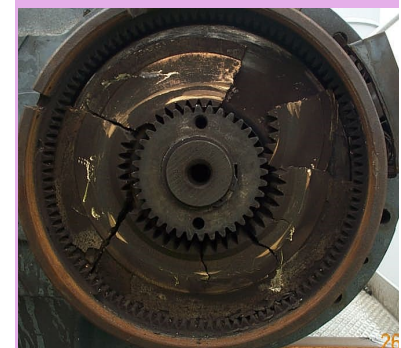


The dropped turbine rotor



Adjustment ring

The disc brake



The failed disc

MATTHEWS INTEGRITY HUB

FAILURE BRIEFINGS

We think it is important in the asset integrity industry to **SHARE INFORMATION** on equipment accidents and failures. This is the main way in which people learn how failures can be prevented and that the same mistakes do not happen again and again.

Most causes of failure are well known and can be prevented by learning from things that have happened in the past

WE INVITE YOU TO PARTICIPATE

The more failure briefings we can show on these pages the better the chance of failures not repeating themselves unnecessarily. If you want to pass on details of failures you've experienced we will be pleased to edit them into our failure briefing format so they can be of greatest benefit to others in the plant integrity community.



HEAD OFFICE

POOR MAINTENANCE /INSPECTION LESSONS LEARNED

THE DIAGNOSIS

The brake disc pads had experienced some wear in previous use and required adjustment. This had not been done correctly with the result that large clearances remained between the rotating disc pads and their static plates. When the brake operated the large clearances resulted in the internal plates not sliding 'square' along the splines shaft. This was made worse by the ends of locating dowel pins fitted to keep the assembly square being 'upset' so they didn't fit squarely into their locating holes.

The reduced and uneven spring forces caused the discs to slip under load, overheating the disc pads and causing them to shatter.

LESSONS LEARNED :How not to let it happen again.



During the investigation it was clear that the mis adjustment of the clearances should have been evident owing to the relative positions of the adjusting ring and the splined components on the shaft.

The plant owner-user left the pre-lift LOLER/maintenance inspection to a third party. It is in the interest of owner-users to ensure that :

- Their crane inspector knows about brake adjustment
- Brake clearances are adjusted to manufacturer's tolerances
- Disc brakes with sliding components are assembled 'square' on their splined shafts.

Matthews Integrity Notes: HEAD OFFICE is OPEN EVERY DAY....0730-2200 Monday-Sunday...That's correct, all week, including holidays.

If we miss your call, leave a message and we will call you back just as soon as we pick it up. Sorry, there's no automated messages, call queueing, voice recognition robots or garbled music. Try it and see.