

Standards & Related Documents Committee

TECHNICAL BULLETIN - OCTOBER 1998

174. Cyclone Twist Bearing Collapse

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We have received information from the Health & Safety Executive concerning the dangerous occurrence, on a 30+ year old Twist ride of Edwin Hall manufacture, at Rainford in June 1997. Examination revealed that the upper bearing of the capstan shaft had collapsed, allowing the shaft to fall through the upper support arm. Although nobody was injured, we believe that this type of failure has, in the past, resulted in serious injuries.

In this occurrence, however, the upper arm had, like many of these rides, been fitted with a catcher plate. This was intended as a safety device to catch the capstan in the event of bearing collapse. The underlying principle is that, while it is not obvious when a bearing is close to breakdown it would certainly be evident once it had occurred, since the capstan would have dropped 12 mm or so onto the catcher plate. The ride could then be stopped and repaired before the catcher assembly itself failed.

In this instance the traditional risk assessment has apparently been shown to be at fault since the bearing failure did not become obvious to the operating staff. The investigation concluded that, after the bearing collapse, the capstan had been running on the catcher plate for several hours at least, but it was not possible to accurately estimate for how long. Ultimately the catcher plate wore through.

This dangerous occurrence reminds us of several points relating to Twist capstan bearings and catcher plates :-

1. The initial failure initiated from the bearing's polymer cage becoming displaced so that the ball spacing was not maintained. Cage wear, due to poor lubrication, makes it easier for such cage displacement to occur. The importance of good bearing lubrication is therefore clear.
2. It is important that there should be a foolproof method of identifying when bearing collapse has occurred (e.g. by measuring the clearance between the catcher plate and the bearing housing). If there isn't, the catcher plate assembly may not serve its purpose.

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3. It is also, as proven in this case, necessary that there should be sufficient capacity in the catcher assembly to survive the period between the checks for bearing collapse described in the previous paragraph. For instance if a daily check is relied upon, the wear allowance must be sufficient to last at least one day. If it isn't then the catcher assembly and inspection regime are, between them, inadequate for their purpose.