

FIELD BULLETIN

January 3, 2023

Please copy and distribute to all personnel as required.

Equipment: 2:1 Roped counterweight

Subject: Counterweight assemblies with 2:1 roping.

Description: There is a possibility of a catastrophic failure when a counterweight sheave bearing fails and causes the sheave to seize and potentially cause the ropes to come off the sheave. Early detection of a possible failure is essential. In an extreme case the seized sheave will tilt and cause excessive force to be applied to the counterweight cheek plates, detaching the sheave and ropes from the CWT assembly which in turn would cause the counterweight and car to fall down the elevator shaft. There have been cases where the bearing failure has gone unnoticed, these scenarios have occurred on some Turnbull-Dover counterweights.

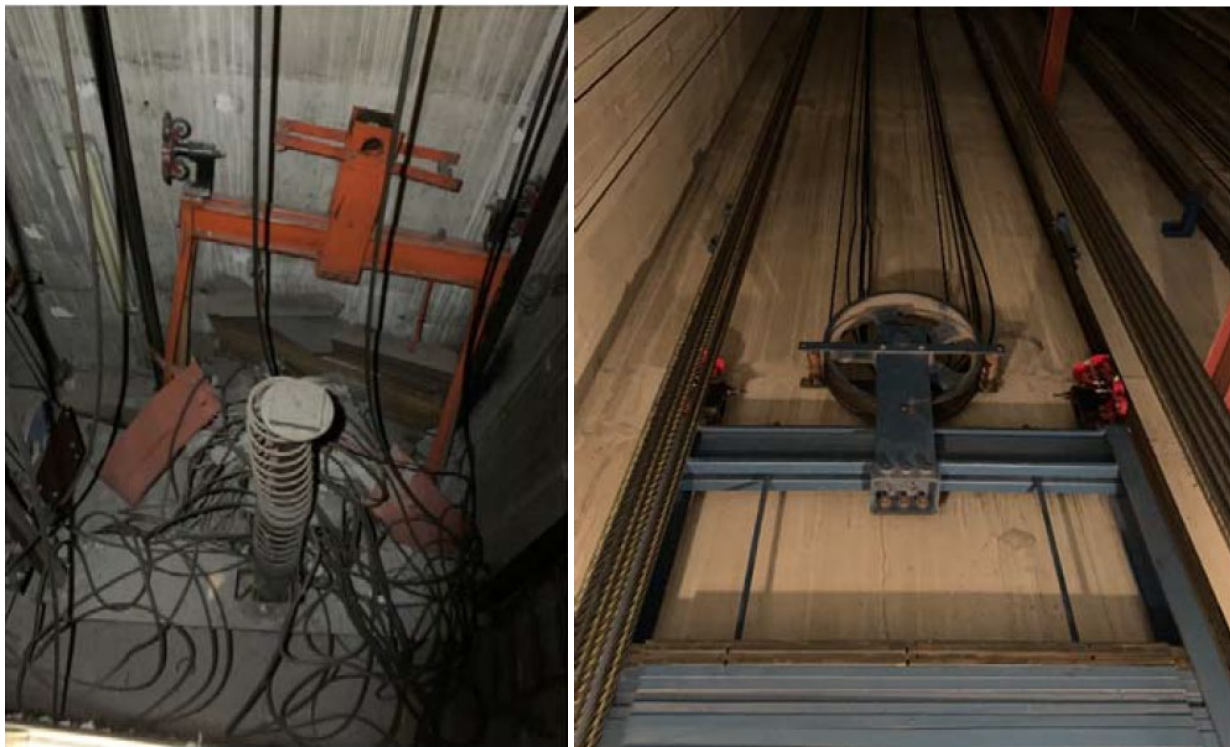


FIG 1 – Failure examples

Note: Failure to comply with this bulletin may affect future warranty claims.

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Fault

In both cases above the bearings failed on a unit manufactured by Turnbull – Dover, with 2:1 roping, where the sheave fixing arrangement failed which should have kept the pulley shaft in position even in case of bearing fracture.

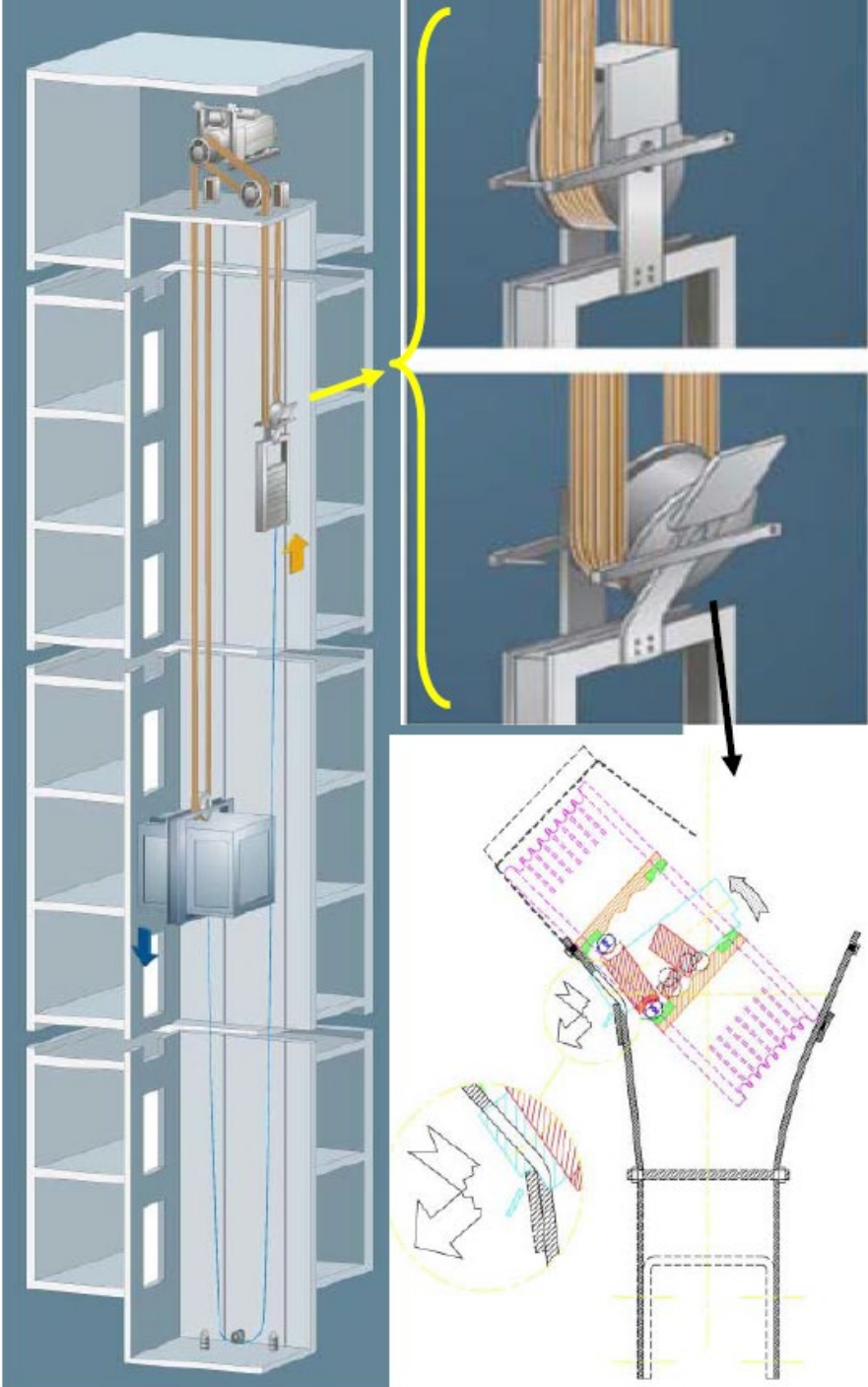


Figure 1: Illustration of bearing failure

Reason for the corrective action

The counterweight sheave shaft bearing can fail due to excessive service life, overload stress or lack of lubrication. The counterweight sheave would then jam on the counterweight shaft. The counterweight sheave is then on an angle placing pressure on the cheek plates which connect the counterweight to the counterweight sheave. This pressure can cause the shaft retaining means to fail and the sheave to separate from the counterweight, possibly resulting in the car being in a free fall condition activating the car safety gear in its most severe operating condition.

In the noted incident the bearings which failed were SKF-6218 sealed bearings which cannot be lubricated and were used on some Dover-Turnbull counterweights. Engineering calculations, based upon SKF data indicate the bearing service life should not exceed 27,000 hours. The life will vary depending on the duty cycle of the installation.

Enforcing regular inspections of all CWT sheave bearings has now been mandated by TKE and this task added to the MCP. This advisory is to inform the industry of this initiative as a means to mitigate risk of any sealed bearing failure in particular those on the counterweight sheaves.

TKE have also designed a retrofit kit to replace the sheave shaft and bearings. The retrofit kit also includes additional rope retainers to mimic the seismic requirements which prevent the hoist ropes from jumping off the sheave. This is now more relevant now that full speed, full load buffer and safety tests are mandatory which apply further stresses to the system.

Retrofit kits may be obtained from TKE parts Canada. Please ensure that the Original Turnbull Job number is available.

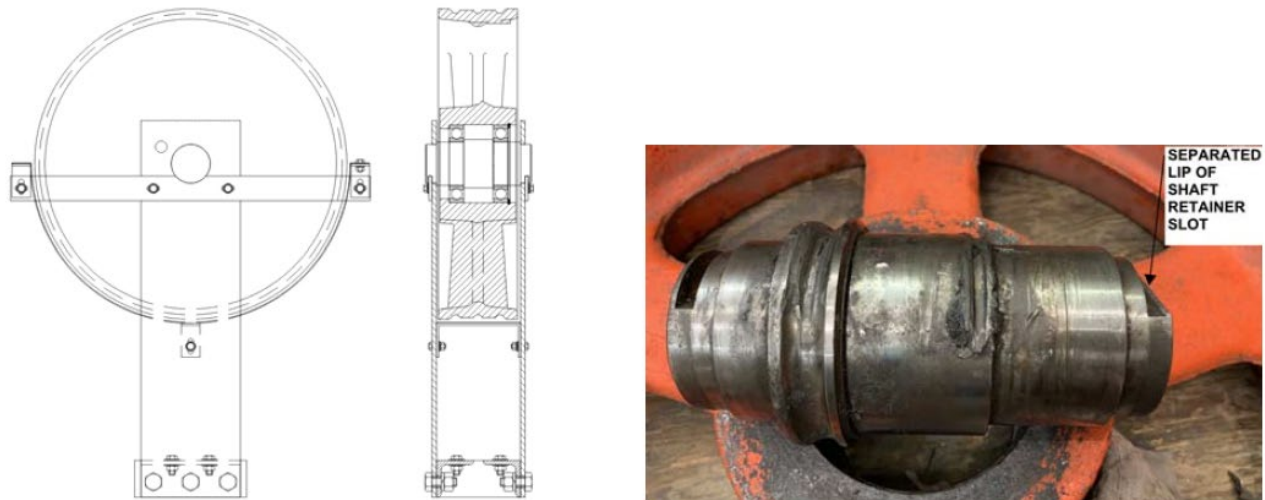
Copy of Engineering Assessment

The following Engineering assessment was completed at the request of TSSA following an incident that prompted this bulletin.

Subject: Engineer's assessment of the damage related to an incident that occurred on July 10th, 2022, to installation 36258, located at 11 Colonel By, Ottawa.

During normal elevator operation the counterweight (CWT) idler sheave separated off the CWT frame. CWT frame fell into the pit. CWT idler sheave fell on the car roof, penetrated through it and landed on cab floor. Car safeties applied stopping the car from a free fall.

The root cause of an incident is the failure of CWT idler sheave bearings. One of inner bearing rings got worn faster than the other allowing the outer ring with roller cage to relocate towards the center of the sheave shaft. Subsequent shaft wear allowed the sheave to skew out of plumb. Sheave started applying horizontal force on side retainer plates and on the lip of shaft retainer slot. The lip of shaft retainer slot snapped off and one side of the shaft dislodged from retainer plate making the sheave to separate off the CWT frame.



Method of preventing such accidents is periodic checks and replacement of sheave bearings. Note that bearings in this sheave design are sealed, lubricated for life, and cannot be lubricated. Bearing life span depends on use. Signs of bearing failure are vibration and noise.

Regards,
Yuriy Trach P. Eng.
ET-AMS-CAN/FLD

Suggested corrective actions

1. Identify all Turnbull – Dover 2:1 Counterweight installations.
2. Notify regional AHJ's and industry of need to prioritize bearing inspections.
3. Include scheduled inspections of sheave shaft bearings in MCP documentation.
4. Mandatory inspection of bearings after CAT 5 tests are performed.
5. Bearing inspections will not be confined to Turnbull installations.
6. Replace suspect bearings and promote retrofit kits with redesigned shafts.

Proposed retrofit

