Helicoper Hoist
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An Agency of the European Union
Starting Point: Occurrence in February 2013

During maintenance flight a dummy load (552lb/250kg) was lost

→ Root cause: overload clutch failed
→ Further investigation revealed several issues with some hoists
→ EASA AD was issued to ensure continued safe operation of the hoist
→ Initiated a service history review
Service History

Fatalities and serious injuries potentially linked to hoist design
Service History

- CAT occurrences rate
- Fatal accident rate
- 27/29.865 safety objective
Service History

Occurrence Categories

- **entanglement**
  - occurrences: high
  - serious injuries: moderate
  - fatalities: low

- **cable rupture**
  - occurrences: moderate
  - serious injuries: low
  - fatalities: low

- **PCDS**
  - occurrences: low
  - serious injuries: low
  - fatalities: low

- **hook**
  - occurrences: low
  - serious injuries: low
  - fatalities: low

- **cable rebound**
  - occurrences: low
  - serious injuries: low
  - fatalities: low

Legend:
- blue: occurrences
- red: serious injuries
- black: fatalities
EASA Airworthiness Directive

Table 1 – Affected Goodrich Hoists P/N

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EASA Airworthiness Directive

The AD introduces 4 elements:

- Periodic overload check
- Reduced Time Between Overhaul (TBO)
- Replacement of hoist if slip observed
- Operating envelop reduction
1. Periodic overload check

→ Catch degraded clutch before it fails
→ Frequency calculated i.a.w. GM 21.A.3B(d)(4)
→ Test every 6 months / 300 cycles
→ Verify if slip point is within (2-2.7g) activation band

Field load check tool
2. Reduced Time Between Overhaul

→ New TBO time is 2 years / 1200 cycles
→ Using improved Acceptance Test Procedure (ATP)
→ Promote better controlled disks / oil (Population 2)
3. Replace if slip observed
4. Operating envelope reduction

Placard 1 – Operational Limitations

Operation with extended cable and load on the hook:
- Maximum permissible bank angle in turn is 20°
- Warning: exceeding 15° of lateral pendulum angle/helicopter vertical axis can lead to clutch slippage
Caution: overload clutch is unlikely to function in case of overload

Placard 2 – For 600-lb [272 kg] rated hoists

OAT above 0°C: Maximum hoist load 550 lb [249 kg]
OAT at or below 0°C: Maximum hoist load 500 lb [227 kg]
Goodrich Hoist Clutch evolution

→ Population 1 (Pop 1)
  → Clutch in a non controlled configuration
  → Replacement is mandatory through AD or life limit
  → Not allowed to be installed
  → Limitations
    → TBO 24 months
    → Field load check tool (FLCT) checks
    → Payload reduction
    → Operational limitations
Goodrich Hoist Clutch evolution

→ Population 2 (Pop 2: No design change to Pop 1)
  → Configuration is controlled and certified
  → Same limitations as for Pop 1
  → TBO extended to 36 + 4 months

→ Population 3 (Pop 3: Improved clutch design)
  → Less temperature dependent
  → Currently 1 project in progress for certification

Pop 3 clutch will not likely bring the Goodrich hoist back to all original limitations (payload / TBO / temperature / operational envelope)
SAE Working Group G-26 „Helicopter Hoists“
- Develops a standard for hoists with overload protection (AS6342)
- Consists of hoist manufacturers, OEMs, operators and authorities
- The draft standard represents the minimum acceptable level of safety
- Widely harmonized between the FAA and EASA
- Includes provisions for new technologies
- Latest ballot was not accepted by the majority

EASA continues the effort of introducing a hoist ETSO
ETSO Schedule

→ To enable a timely publication, EASA is currently drafting an ETSO not referring to SAE AS6342
→ EASA Rulemaking Task has started
  → Improvement of the current CS-27/29 rule on external loads (CS-27/29.865)
  → Creating an ETSO based on SAE AS6342
→ Terms of reference for rulemaking task expected by October 2019
→ Publication of ETSO by mid 2020
→ Until publication, draft SAE standard is useable for hoist certification
Important safety improvements in ETSO

→ Rebound of cable:
  → Rebound of the cable should have no catastrophic effect on the rotorcraft

→ ETSO Hoists will have a mandatory overload protection system
  → Increases the reaction time for the pilot in case of entanglement
  → Limits the energy in the cable in case of cable rebound

→ Hoist System will meet latest system safety requirements
  (redundancy / limited nb of single load paths with CAT effects)

→ Full fatigue and damage tolerance of the hoist structure

→ Enables introduction of synthetic cables
Next Generation Hoists

→ EASA has been supporting the development of new hoists
→ Currently several hoist certification projects are under investigation by EASA (STC or Major Changes)
→ Next Gen hoists could enter the market by end of 2020

Vincorion Skyhoist  
Collins (Goodrich) Pegasus  
Reel Class Alpha Hoist
Your safety is our mission.