

B/L: 406.00  
SYS: 10-Ton Bridge  
Crane HMPS

Critical Item: Hoist Gear Drive (2 Items)  
Find Number: 1  
Criticality Category: 1

JAN 29 1995

SAA No:	01FS0134-001	System/Area:	10-Ton Bridge Cranes/ HMPS (Bldg. M7-1212)
NASA Part No:	None	PMN/ Name:	K60-0579/10-Ton Bridge Crane HMPS
Mfg/ Part No:	Shepard Niles Crane Corp./ Bulletin Sheet 2527A	Drawing/ Sheet No:	69-K-L-11592/4 69-K-L-11593/4

Function: The hoist gear drive transmits power from the hoist gear reducer to the wire rope drum.

Critical Failure Mode/Failure Mode No: Gear disengages/01FS0134-001.004

Failure Cause: Structural failure of gears, shafts, and the gearbox housing.

Failure Effect: Load (FRCS module or OMS Pod) suspended from hoist will drop, possibly resulting in loss of life from toxic vapor. Failure is detectable by abnormal noises and movements up to and including dropping the load. Time to effect: seconds.

#### ACCEPTANCE RATIONALE

##### Design:

- The gearbox is an off-the-shelf item manufactured by Shepard Niles. Its design complies with Crane Manufacturers Association of America (CMAA) and American Gear Manufacturers Association (AGMA) Standards.
- The gears are splined to shafts or integrally machined and are retained in place by shoulders within the confines of the gearbox.
- Load bearing members, such as the gear case and shafts, have been designed so that the calculated static stress, based upon the rated load, does not exceed 20% of the average ultimate strength of the material. (5:1 S.F.)
- All gearing design is based upon AGMA standards 220.02, "Rating of the Strength of Spur Gear Teeth" and 210.02, "Surface Durability (pitting) of Spur Gear Teeth."

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#### Hoist Gear Drive (Continued)

- The rated load is 20,000 pounds. The maximum applied load in use is 15,000 pounds. This yields an operational factor of safety of 6.25:1.

#### Test:

- Pre-operational set up (positioning and attaching hook to handling fixture) to support lifting operations in OMI V5004 or OMI V5016 verifies proper operation of crane components and all functions.
- OMRSD File VI requires annual performance of a rated load test to verify system integrity.
- A load test at 100% of rated load is performed annually by OMI Q6076 in accordance with a NSS/GO-1740.9 requirement.
- An annual operational check of the hoist under full rated load is performed in accordance with OMI Q6076.
- Acceptance test at 125% of the rated load was performed on initial installation.
- Oil sample testing is performed annually by Ferrography. The results are returned to System Engineering for review and is documented in the crane log book.

#### Inspection:

- OMI Q6076 requires:

Monthly inspections include general condition of all operating mechanisms, the motor brake and reduction gear oil level.

#### Failure History:

- The PRACA database was queried and no failure data was retrieved against this component.
- The GIDEP failure data interchange system has been researched and no failures of this component were found.
- Shepard Niles was contacted and stated there had been hoist gear drive failures in commercial use. The manufacturer stated that no failures were due to faulty design or manufacturer defects. In every instance failure had been attributed to operator misuse (i.e. shock loading while attempting lifts at higher than rated loads).

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Operational Use:

- Correcting Action:

There is no action which can be taken to mitigate the failure effect.

- Timeframe:

Since no correcting action is available, timeframe does not apply.