

STRUCTURAL FAILURES OF LARGE SPAN SEMI-PORTAL GANTRY CRANES

INCIDENT

The upper bogie of a 40 tonne SWL semi-portal crane (25 metre span, 18 metres high) stopped suddenly during longitudinal travel. The suspended load and the lower bogie continued to travel for a short distance causing the semi-portal frame structure to twist significantly. This twisting action caused several bolts on both connections to fail in tension mode and the upper bogie box section was deformed. A sufficient number of bolts remained intact to support the structure and thereby prevented a catastrophic collapse of the crane.

Two other similar incidents have occurred involving another semi-portal crane. This crane has a 20 tonne SWL, 41 metre span, is 11 metres high and is located at the top of a process plant building.

CAUSE

The upper bogie of the first mentioned crane stopped due to a seizure of the drive wheel bearing.

With the second crane the anti-derailment plates scraped hard on the side of the crane rail in one case and the bogie drive wheel became loose and twisted on the shaft in the other incident.

PREVENTATIVE ACTION

A risk assessment should be carried out for all semi-portal and portal gantry cranes to determine if damage can occur to the crane structure when the motion of one bogie stops or slows relative to the other bogie. The following measures should be considered for those cranes identified as being susceptible to such damage.

1. Provision of an effective electrical control system which will cut the power supply to all bogies when the motion of one bogie stops or slows relative to another.
2. Reduction of the crane longitudinal travel speed where necessary.
3. Stiffening of the semi-portal or portal frame structure including the connections where necessary.
4. Provision of guide rollers to both bogies.
5. Provision of a maintenance regime which allows for regular inspections of critical brake components on both bogies. Particular attention should be given to the air gap between the friction material and the brake path.

6. Provision of a comprehensive maintenance regime for those components that could impede the motion of the bogies. Such components may include the bogie wheels, wheels shafts, wheel bearings, guide rollers and anti-derailment brackets.
7. Regular inspections of the crane rails to ensure they are in proper alignment and have no significant scoring marks caused by a faulty bogie or storm clamp.

J M Torlach
STATE MINING ENGINEER

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