NAFLIC

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Standards & Related Documents Committee

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163. Vekoma SkyFlyer

NAFLIC member Leisure Technical Consultants Ltd report fatigue defects in a Vekoma SkyFlyer ride. This is a double gondola, counterweighted, ride of the "Ranger" generic type.

The fatigue cracks have been found in the main radial arms in two significant locations. The first location was at the position of the welded connection of the tie members which brace to the gondola structure. Cracking was first detected here after 6 years service, possibly 6000 operating hours in this case. A second location, at the extremity of the main arm where it is welded to the gondola floor keel member, first showed damage after 9 years.

It is our view that the two problems may be inter-related, following from the difficulties associated with this particular design of the welded connection of the tie brace members to the radial arm, both of which are steel rectangular hollow section. The brace hollow sections have only about half the width of the main arm section and are welded directly onto the centre of its wall. This allows "diaphragming" of the main arm member's side wall resulting in significant localised wall bending stress fluctuations. Fatigue of the main member at this location is not the only consequence, but the wall flexibility prevents the tie braces from properly fulfilling their purpose. That is to say, the diaphragming of the radial arm allows axial movement of the braces and bending of the lower section of arm is not properly inhibited. There will be consequent bending stress fluctuations occuring in the radial arm at the keel connection.

It is our view that, in rides of this type, tie members are of considerable importance in containing some of the arm and gondola structural fatigue stress ranges to acceptable levels. We also believe it to be important that, where adjustable (turnbuckle) tie braces are used, preset tension should be specified and instructions for checking should be included in the Manual.

The weld cracking at the second of the two locations discussed in this Technical Bulletin is in a normally inaccessible position. Extensive strip down has been clearly justified in this case.

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