3. Classification of Cranes and Runways

3.1. Reason for crane classification

The main purpose of classification of the crane structures and crane runways is to provide a basis for strength and fatigue assessment of the runway system. The main parameters used in the classification are the number of load application cycles and the load spectrum. The load spectrum denotes the shape of the statistical cumulative frequency curve. When a crane lifts loads close to the rated load most of the time it is termed 'heavy duty' crane and consequently a higher classification designation applies. Most cranes are not required to lift heavy loads every time, thus their spectrum factor is lower and this in turn produces a lower classification designation. The second consideration in the classification is the number of lifts in the design life of the crane (25 years normally). In AS 1418.1 there are 10 utilisation classes, the lightest being Class U0, and the heaviest, Class U9.

Without the classification system it would be necessary to conduct a load spectrum analysis for each production facility, that is to study the work pattern, the number of lifts of each load range and the magnitude of loads in each cycle so that a statistical analysis can be carried out. Such a study can be very time consuming and costly. High cost may be warranted where large number of cranes is in operation in the same, well-defined process, for example the steelworks, alumina smelting and ship loading/unloading.

3.2. Utilisation Class – Global design

Crane bridge structures are classified on the basis of the total number of operating cycles based on the 25-year design life of the crane. It should be understood that an operating cycle starts with hoisting the load from the initial position, travelling with the load and depositing it to its final position. The design life of the crane runway may be somewhere between the minimum of 25 years, as specified in the AS 1418.18, and 30 year life used in building design and this would be subject of a design brief from the building owner.

The number of operating cycles to be adopted for design of the crane runway could be in proportion to the respective life of the runway and the crane for a crane where hoisting of the loads occurs in the same position in the least favourable location for the girder. But because not all crane operating cycles occur over the most unfavourable locations it becomes appropriate to reduce the runway load spectrum factor, K_p by one increment. The best way to accomplish this is to carry out a crane/runway utilization study to obtain a realistic number of operating cycles and load spectrum factors.

The counter argument can be advanced that the crane passage cycles over certain runway spans, eg at loading bays, may be more frequent than on the average. AS 1418.18 require that the same number of

Crane Runway Girders

Limit States Design

Second Edition 2003

AUSTRALIAN STEEL INSTITUTE
(ABN)/ACN (94) 000 973 839

Branko Gorenc

Contents

List of Figures