Fatigue failure of skew beam grid steel bridges ï causes & assessment

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Abstract

ABSTRACT: The aim Of this research is to investigate the Causes Of failure Of Mansoura-
Belk-as roadway bridge junction. This junction is one of 4 similar junctions between the bridge
and the crossing two highway roads. The junction consists of skew beam grid steel bays. The
structural system of the grid consists of 3 main girders connected to each other by highly
skewed cross girders connected by skew web stiffeners. Due to the subsequent overloaded
trucks passing over the junction for a considerable period; the failure of two out of three main
girders occurred near the main girder splices (which are not at the mid-span).
By investigating the design capacity of the girders, it was evident that the failure wasn't just
due to overloading. Since the failure of the bridge took place Only 8 years after its construction,
a fatigue life assessment was conducted. The assessment showed that the fatigue detail category of
the highly skew web stiffener connection was highly reduced which needed a thorough investoga-tion. Thus, a fmite element model is developed to accurately model the stress transition zone near
the splices close to the skew ',verb stiffeners at the connections between main girders and the cross
girders. A small parametric study was also conducted to imcstigate the elect of different param-
esters on the stress concentration factors. Several observations, conclusions and some practical
recommendations for designers are gisen.

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