

FAT2 EXERCISE: CLASSIFICATION OF DETAILS

PROBLEM 1

For each photo in Figure 1, highlight the area you think is critical in fatigue, draw the corresponding stress direction and crack directions, give also the corresponding detail category.

a) Cover joint with preloaded high strength bolts



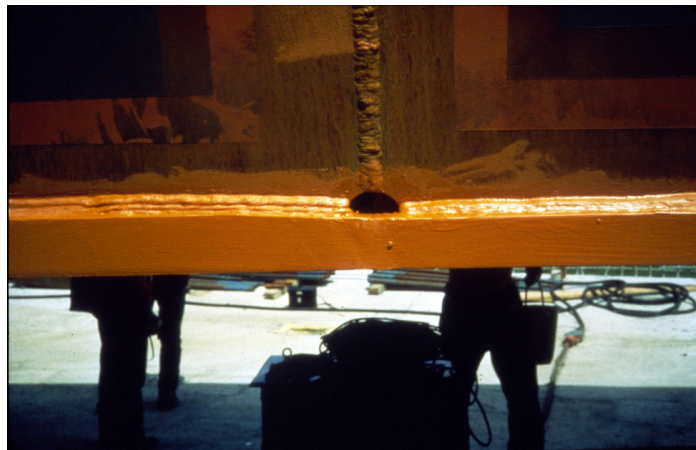
(b) Web of a bridge box girder with longitudinal and transverse attachments/stiffeners



c) Bridge main girder – crossbeam connect.



(d) Bridge flange and web connection



e) Light mast pole footing



f) Runway crane girder

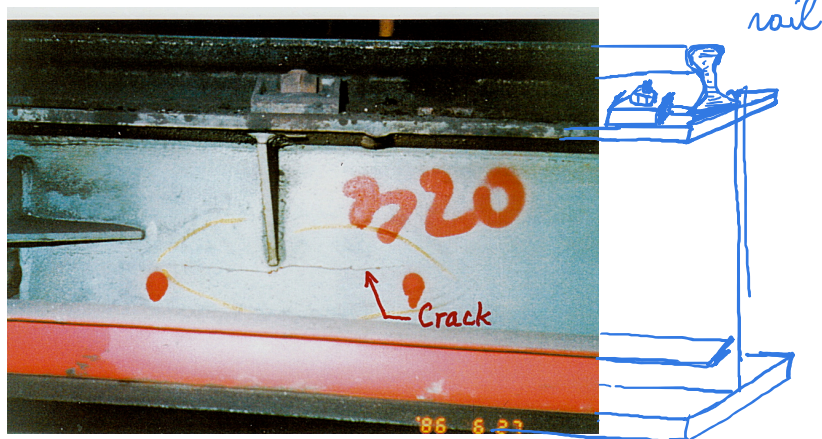


Figure 1: Photos of details on steel and composite structures

PROBLEM 2

Data

Let us consider a steel-concrete composite bridge. An isometric general view of a typical section of the structure is shown in Figure 2. It has different details where fatigue damage and cracking can occur. An enlarged view with all the details, as well as the main loading direction of each component, is given in Figure 3.

Questions

1. On Figure 3, identify the different potential locations of fatigue cracking (draw where and in which direction each crack will propagate).
2. Determine, for each of the location found under 1, the corresponding detail category according to Eurocode 3 or SIA 263 (Appendix E). Briefly justify your choices.

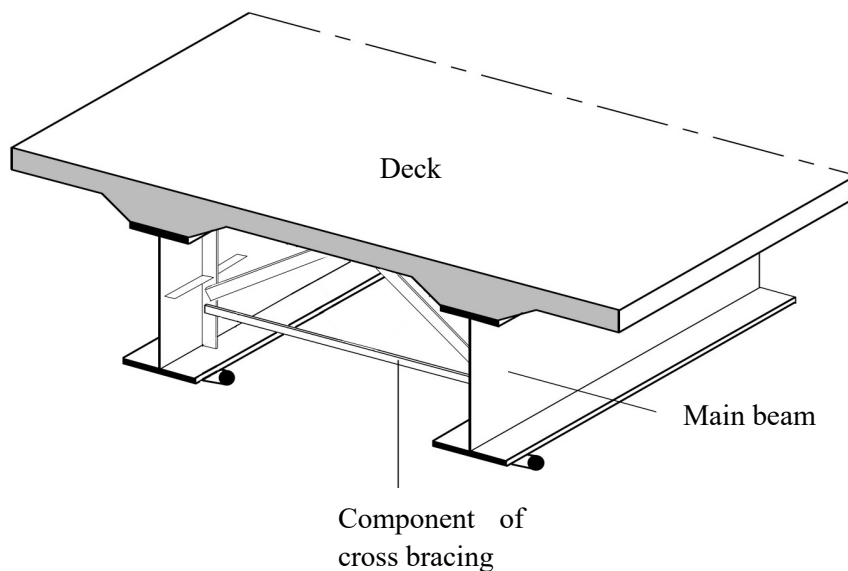


Figure 2: Isometrics of a typical cross-section of a composite bridge

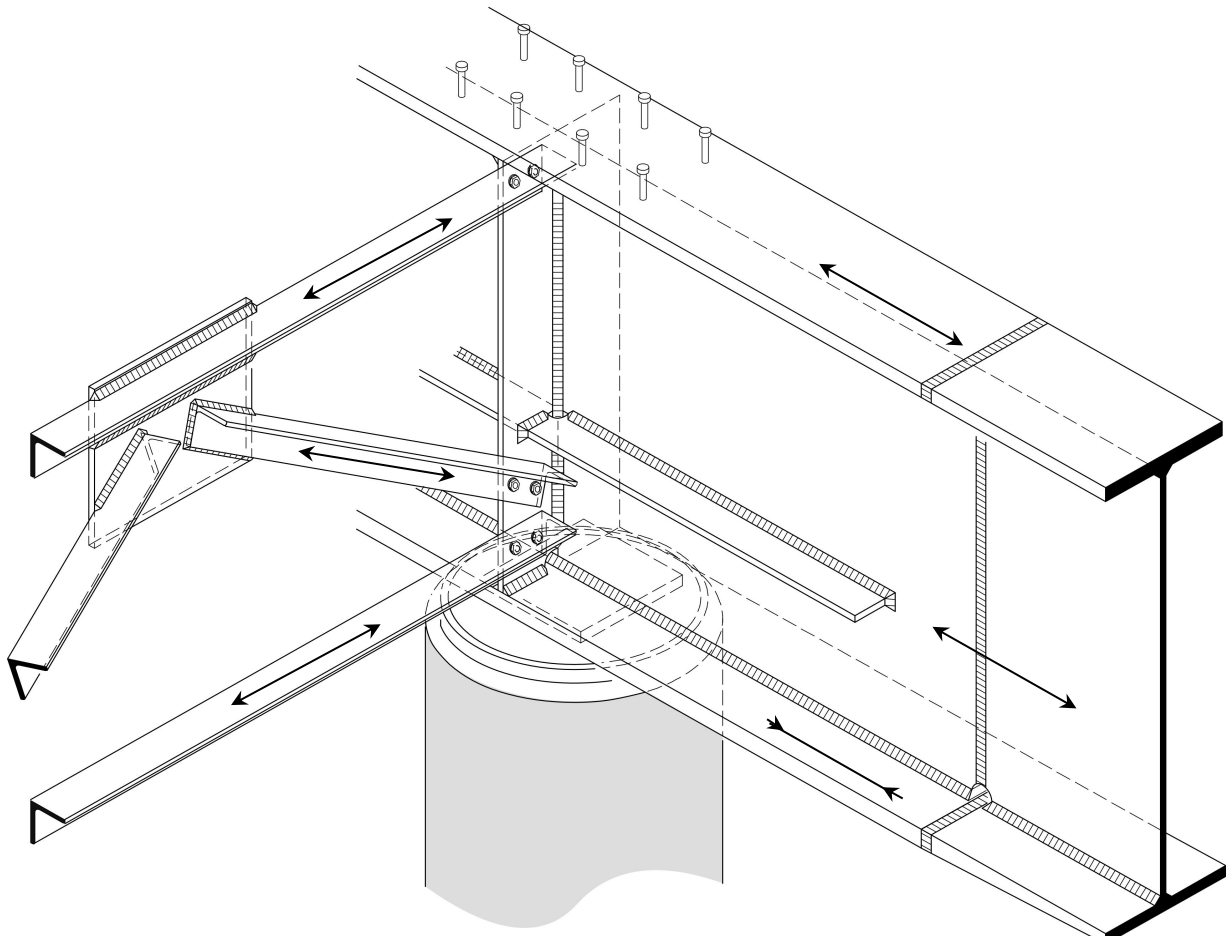


Figure 3: Isometry of the support region with the main loading direction of each component (ref.: adapted from a figure of ESDEP lecture 12.9)

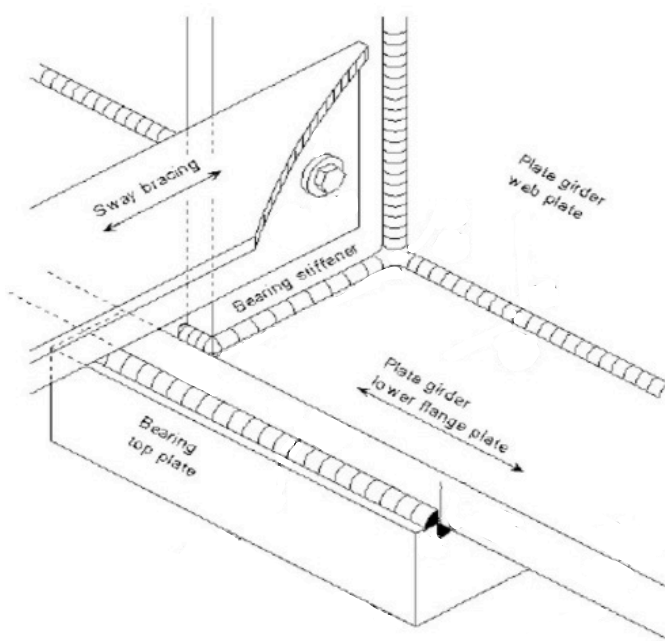


Figure 4: Isometrics of the support itself (ref.: figure of ESDEP lecture 12.9)