

## Issue 2024/1

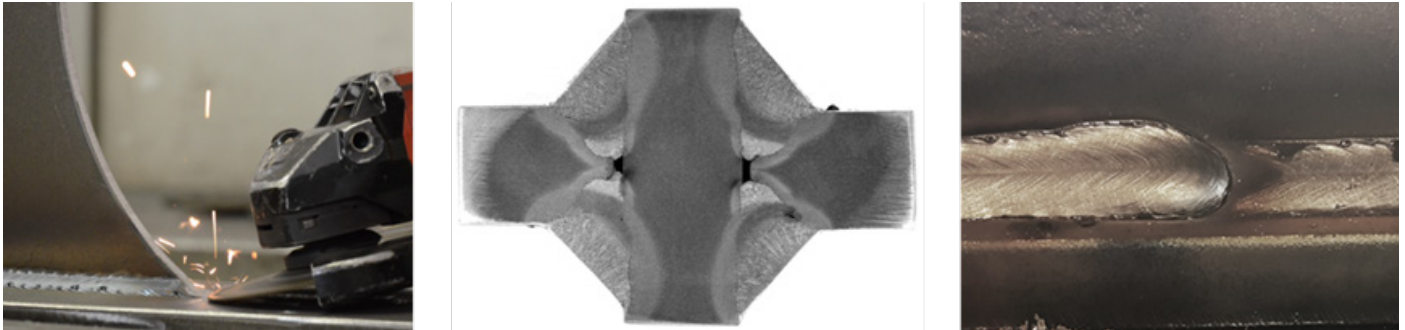
### Evolution of fatigue classification catalog for economically optimized steel structures | AiF No.: 21368N

#### Summary of the research project AiF No.: 21368N

The dimensions of fatigue-loaded structures, such as bridges, towers, masts, or crane run-ways, are determined by fatigue verification. The fatigue classification catalog of DIN EN 1993-1-9, which is based on a collection of test data and was processed in a previous project (ICR No. 19178N), plays a central role here. It was found that the fatigue classification of some details is only general, although a more cost-efficient differentiation would be possible. On the other hand, the fatigue classification, which is sometimes carried out in detail, cannot always be confirmed with test data, as is the case with previously unexplored differentiations regarding the geometric influence. Another weakness is the lack of a link between fatigue classifications and the weld seam or workmanship quality. It is well known that, for many details, usability depends significantly on the manufacturing quality. Assessment methods for tolerance deviations of welded structures should also be supplemented for cost-efficient fatigue design.

The project included the optimization of the notch classes of critical design details with the aim of ensuring an cost-efficient fatigue design. The fatigue classification catalog was

designed to be more advantageous and closer to real conditions based on an enhanced test database and was adapted to the new possibilities of manufacturing and nondestructive evaluation. Finally, only a more realistic classification of the notch details offers the possibility of better correlating execution qualities (DIN EN 1090, DIN EN ISO 5817) with design requirements (DIN EN 1993-1-9).



*Image 1: Details examined in the research project: Longitudinal stiffener with ground end (left), cruciform joint with root fusion defect (middle) and longitudinal seam with attachment point (right).*

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