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STRUCTURAL HEALTH MONITORING OF THE HISTORIC PADERNO D'ADDA BRIDGE (1889)

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San Michele Bridge, also known as the Paderno d'Adda Bridge, is a distinguished example of 19th-century iron architecture of Italian industrial archaeology. Spanning 266 meters across the Adda River in Lombardy, northern Italy, this historic viaduct, completed in 1889 by the Società Nazionale delle Officine di Savigliano, continues to serve as a strategic transportation link within one of Italy's most industrialised regions, supporting both rail and road traffic more than 130 years after its construction. Currently under consideration for inclusion in the UNESCO World Heritage List, the bridge has undergone significant maintenance interventions between 2018 and 2020 to ensure its structural integrity and preserve its historical and architectural value (Ferrari et al. 2020, 2021). As part of ongoing preservation and research efforts, an experimental campaign was carried out in May 2024 to investigate the dynamic behaviour of the bridge under operational conditions. Sensors were deployed on both the bridge and a passing railroad vehicle to capture acceleration data, thereby enabling preliminary evaluation of the bridge's response to vehicle-bridge interaction via finite element modelling. Signal post-processing and structural modelling are currently underway (Ermolli et al., 2025; Guerini et al., 2025; Ferrari et al., 2025). This study forms part of a broader research initiative aimed at establishing a comprehensive structural health monitoring (SHM) platform for the bridge, allowing for efficient, fully digitalised management of this iconic engineering masterpiece.

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