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Studies on maintenance of aged steel bridges

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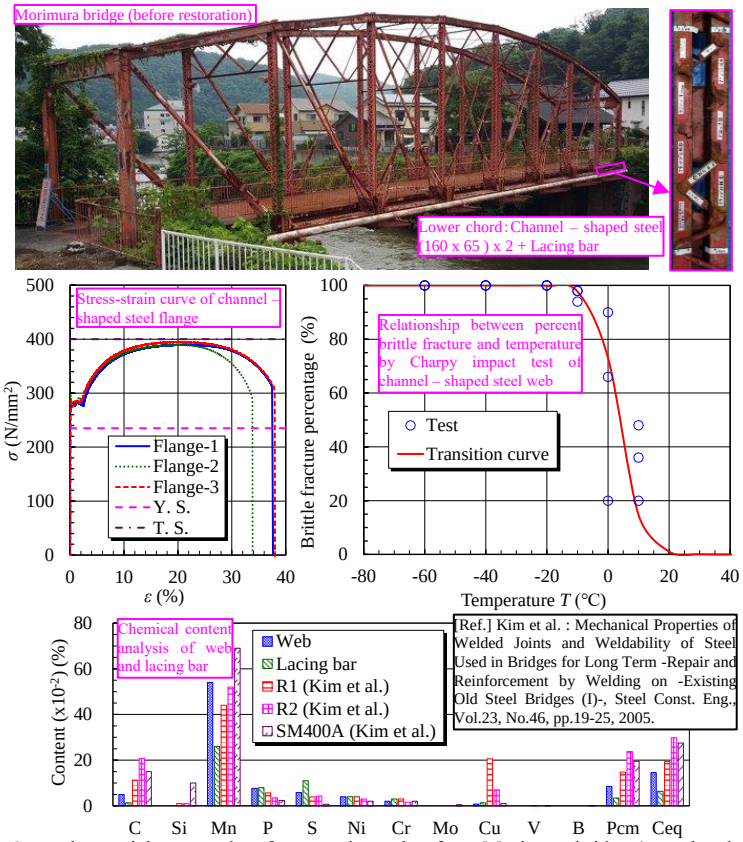
Keywords	aged steel, material properties, built-up member, small size suspension bridge, ultimate strength, finite element method

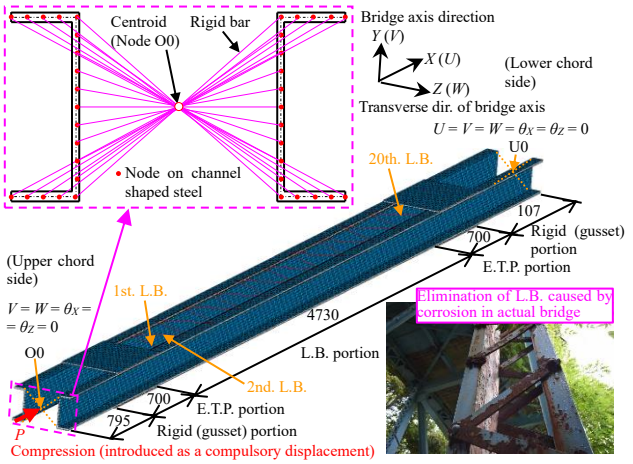
Technical Support Skills
Material properties of aged steel and its investigation
Ultimate strength evaluation and repair method of built-up members with damage caused by corrosion
Ultimate strength evaluation of steel members with thinning and crack caused by corrosion
An effect of cable system deterioration on mechanical behavior of small size suspension bridge

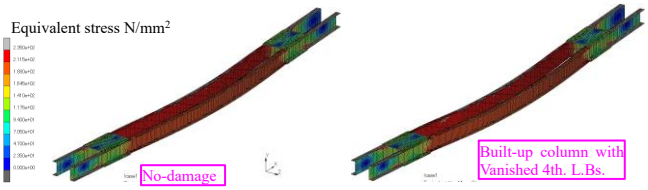
Research Contents

(1) Investigation on material properties of aged steel removed from actual bridge
(2) A study on load carrying capacity of built-up column with vanished lacing bar
(3) A study on load carrying capacity and deformation properties of small size suspension bridge with deteriorated cable system

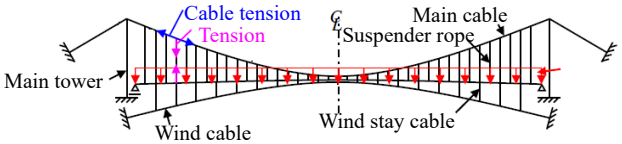


Several material test results of removed member from Morimura bridge (completed in 1906)
(Tensile strength of removed member is lower than its minimum proof value (400 N/mm²). Percent brittle fracture of removed member shows 100% below -20 degrees Celsius. Carbon content of removed member is low compared to that of current steel. Contents of phosphorus and sulfur are high as well.)





Numerical investigation on the ultimate strength of built-up member with vanished lacing bars (L.B.)
(Vanishment of fourth lacing bars does not give significant effect on the load carrying capacity.)



Frame analysis model of small size suspension bridge
(Finite displacement analysis will be conducted after calculation of the shape and prestress of cable system under dead load.)

Available Facilities and Equipment

Universal hydraulic testing machine (2000kN capacity)	General purpose finite element analysis program MSC Marc/Mentat
Personal computer (Dell Precision 3640)	Self-made non-linear finite element analysis program
Personal computer (Be-Clia)	Exterior digital caliper gauge (TECLOCK GMD-1J)
Fortran compiler (Intel)	Digital point micrometer (Niigata Seiki MCD232-25P)
General purpose pre and post processor GiD	Portable Data Logger (TML TDS-150)