

Celebrating Dr. Nobutaka Yurioka, a metallurgical engineer extraordinaire

It is with great sadness that we announce the passing of Dr. Nobutaka Yurioka on the 9th of January 2025, at the age of 84.



After graduating in metallurgy from Kyoto University, he joined Fuji Iron & Steel in 1965, which later merged with Yawata Iron & Steel to form the Nippon Steel Corporation (NSC). Steel is the basis of all structural engineering important in ensuring the quality of life, but it must be weldable. This necessitates a local application of heat, which inevitably disrupts the structure of the material in its vicinity. Beginning in 1970, he studied at MIT for two years at the Centre for Ocean Engineering, and in 1972 he returned to be assigned to the NSC Welding Research Centre. This was in the days when the fabrication of giant offshore structures for oil and gas production became vital, Yurioka's talents were honored with his appointment in 1989 as the Head of the Welding Research Centre. Given his long-standing service, both in technical leadership and in nurturing vast numbers of young engineers, he was appointed Fellow of Nippon Steel in 1995, treated as an

Executive Officer.

His earliest open-publication dealt with a rational approach to fatigue crack growth under non-uniform welding residual stresses. On the same theme, the systems analysis of the significance of weld defects, to be followed by an amazing publication demonstrating the persistence of accumulated hydrogen at the weld fusion boundary, some four days after the completion of welding! And he later addressed the role of preheat in multipass welds, on hydrogen accumulation at the root. This kind of work is vital given the pernicious and often unpredictable failures resulting from the role of hydrogen in embrittling iron. It is not an exaggeration to say that he led the world in showing how welding research radically altered the design and manufacture of structural steels. Alongside detailed investigations, he had the knack of emphasizing simple equations that can be used by many to avoid unforeseen failures; just one example is the carbon-equivalent equation which he developed with Suzuki and others to deal with low-carbon steels that were not adequately covered by that recommended by the then international standards. It is often the hardness in the heat-affected zones of welds that causes problems, but these difficulties can in principle be mitigated by the appropriate application of simple equations – Yurioka's analyses had a global influence on the practice of welding, with the methods available for anyone to conduct estimates on an open on-line facility.

Nobutaka Yurioka was an utterly decent and humble human being, approachable by anyone, irrespective of status. He was not only a giant of the subject, but his name can be associated with the safe fabrication of offshore technologies, the longest single-span bridge in the world, automotive welding, the fabrication of massive penstocks, the investigation of earthquake failures

of civil engineering structures, the flash-butt welding of pipes in arctic conditions, and the list goes on. Dr. Yurioka was a beloved figure in the welding and steel community. Known for his friendly and cheerful demeanor, he built a strong international network, mentored so many young engineers, and fostered collaborations across the field. He was also known for his love of Japanese sake, karaoke, tennis, and spending time with his wife Tsuneko and friends.

Dr. Yurioka's passing is undoubtedly a loss to the welding science community, but his contributions have lasting value.

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