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**Evolution of microstructure of CSM345 steel from the surface to the interior of multifunction cavitation**

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The hardness and microstructure at and just below the surface of Cr-Mo steel processed by a combination of Water Jet Cavitation (WJC) and ultrasonic cavitation, which we call Multifunction Cavitation (MFC), were investigated using scanning electron microscopy and micro Vickers hardness testing. Moreover, we also investigated the dependence of the microstructure and hardness on the MFC processing time and compared the results to those for WJC. MFC processing improved the corrosion resistance of the specimen surface and both WJC and MFC converted the tensile residual stress into compressive residual stress. Regarding the microstructure of the WJC-processed specimen, protrusion and disappearance of cementite from pearlite grains were observed at the specimen surface. Voids and cracks tended to occur at depths of 0.5-1 mm from the surface, but were not observed at depths of 2-3 mm. For the MFC-processed specimen, a precursor that results in the formation of spherical cementite inside pearlite grains was observed at the specimen surface and cementite spheroidization was observed at depths of 0.5-1 mm below the surface. Voids and cracks were not observed within the specimen.

**Biography**

Daichi Shimonishi has completed his Bachelor of Engineering at National Institute of Technology, Ube College. Currently, he is Senior in Tokyo University of Science, Yamaguchi.

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