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A Study on Diffusing Aspect and Ventilation of Metallic Fume for Improvement of Working Environment in a Fabrication Shop (Part 1 Measurement of metallic fume)

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Summary: As a recent tendency to take high interest in the environmental problem, the time has come to reconsider the present working environment. Especially, air pollution caused by the generated metallic fume during the progress of cutting and welding in a fabrication shop is a hygienic issue for labor health. For settling this matter, it is necessary to take the pollution-control measures that are desirable to conform to the diffusing aspect of metallic fume in a fabrication shop. However, the physical property and movement characteristic of fume as minute particles have not been grasped accurately even now. For the purpose of improving the working environment in a fabrication shop, the measurements of distributional concentration and particle size of metallic fume at N/C cutting line, sub-assembly line and cubic block manufacturing line in two shipyards were carried out. Moreover, the turbulent diffusion state of fume corresponding to measurement conditions, in which it has tendency to form those stagnant in absence of advection effect on turbulent gas flow, was numerically analyzed by using $k-\varepsilon$ model based on *SIMPLE* algorithm. As the results, the prediction of fume diffusion shows considerably good agreement with the measurement data. Then, the relation between the ventilation system and the fume transportation state on the working site is investigated evidently using experimental data and calculated data, for establishing the ventilation system with efficient control of fume flow.

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