33/2/3947 Hodgson, M.R. Theoretical and physical models as tools for the study of factory sound fields.

Theoretical and experimental tools are developed for the study of factory sound fields, characterised by the sound propagation (SP) and the reverberation time (RT). The SP is the variation of sound pressure level, normalised to the source power level, with distance from an omnidirectional source. The tools are used to investigate the characteristics of, and the primary factors influencing, SP and RT in factories. The factors considered are geometry, acoustic properties, contents or 'fittings', noise sources and air absorption. A review of published literature, relevant to sound fields in factories, is presented. A theory is consolidated for prediction of SP and RT in idealised, long, factories when empty and 'fitted'. The theory developed is used to investigate qualitatively SP and RT in idealised factories.

Factory scale-modelling techniques are developed. The performance of crossing air-jet noise sources is investigated. Full details of 1:16 and 1:50 scale models for use in the experimental investigations, and the associated instrumentation, are given. The models are used to study the influence of factory shape, fittings and ceiling absorption. Factory modelling is evaluated as a research tool and as a design aid. Results of measurements made of SP and RT in four full-size factories, when empty and fitted, are reported.

The problems of the diagnosis, measurement and estimation of values of factory-acoustic parameters are considered. The results of measurements of the sound absorption of two factory machines are presented. The accuracy of in-situ measurement of the sound power levels and directivities of industrial noise sources is investigated theoretically and with scale models. Finally, the results of the investigations are condensed into a unified description of SP and RT in factories, and the implications of the results for factory noise control, theoretical and empirical prediction and scale modelling are discussed.