

SAMPLING INSPECTION PLANS FOR CONTINUOUS PRODUCTION WHICH INSURE A PRESCRIBED LIMIT ON THE OUTGOING QUALITY

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1. Introduction. This paper discusses several plans for sampling inspection of manufactured articles which are produced by a continuous production process, the plans being designed to insure that the long-run proportion of defectives shall not exceed a prescribed limit. The plans are applicable to articles which can be classified as "defective" or "non-defective" and which are submitted for inspection either continuously or in lots. In Section 2 the notions of "average outgoing quality limit" and "local stability" are discussed. The valuable concept of average outgoing quality limit for lot inspection is due to Dodge and Romig [4], and that for inspection of continuous production to Dodge [1]. Section 3 contains a description of a simple inspection plan (SPA) applicable to continuous production and a proof that the plan will insure a prescribed average outgoing quality limit. Section 4 contains a proof that this inspection plan also has the important property that it requires minimum inspection when the production process is in statistical control. In Section 5 is contained the description of a general class of plans which possess both these important properties.

The problem of adapting SPA to the case when the articles are submitted for inspection in lots instead of continuously, is treated in Section 6. Some methods of achieving local stability are discussed in Section 7 and a specific plan is developed there. Finally Section 8 discusses the relationship between the present work and that of the earlier and very interesting paper of H. F. Dodge [1], mentioned above.

If a quick first reading is desired the reader may omit the second half of Section 3 (which contains a proof of the fact that SPA guarantees the prescribed average outgoing quality limit) and the entire Section 4 except for its title (the proof of the statement made in the title of Section 4 occupies the whole section).

2. Fundamental notions. In this paper we shall deal only with a product whose units can be classified as "defective" or "non-defective." We shall assume that the units of the product are submitted for inspection continuously, except in Section 6, where we assume that they are submitted in lots. Throughout the paper we shall assume that the inspection process is non-destructive, that it invariably classifies correctly the units examined, and that defective units, when found, are replaced by non-defectives. By the "quality" of a sequence of units is meant the proportion of defectives in the sequence as produced. By the "outgoing quality" (OQ) of a sequence is meant the proportion of defectives after whatever inspection scheme which is in use has been applied. If this scheme involves random sampling, then in general the OQ is a chance variable.