

A FURTHER INVESTIGATION INTO THE PREPARATION OF LOW GRADE FOOTINGS

I. INTRODUCTION

As pan boiling is the last of a series of operations designed to remove sucrose from solution, and as the liquors arriving at the pan loft are in a concentrated form, any small loss at this station will represent a relatively large part of the factory's total operational losses: hence the importance of exhausting a molasses of sucrose as thoroughly as possible before allowing it to leave the factory. As the low grade strikes represent the sugar manufacturer's last chance of removing sucrose from solution, they have attracted much attention, resulting in a considerable improvement of boiling systems.

In the early days of the sugar industry low grade molasses was boiled "string proof" or blank. It was concentrated in the vacuum pan and then struck to large cooling tanks where it crystallized and remained at rest from one to several weeks or months before being cured.

An improvement on this is the Java system of boiling low grade molasses to grain. Syrup is grained and the grain built up ^{with} ~~the~~ syrup to form a footing strike. Mol-asses of 48-50 purity is boiled onto a part of this strike to produce the Java or C strike, the purity of which is controlled at about 56 by recirculation to yield a final molasses of 29-30 apparent purity.

A further advance is afforded by the work of Webre (1) in Puerto Rico. He produces a footing for his low grade strike by seeding A molasses of about 60 apparent purity with icing sugar. Two conditions - supersaturation control and mechanical circulation - are essential to the success of this operation.

Gomez (2) has modified Webre's system to suit his conditions at Skeldon in British Guiana. A molasses of about 65 apparent purity is grained in the pan, the granulation is checked and A molasses boiled onto this grain to produce a footing strike.

This general progress in low grade boiling methods has resulted in important advantages. There is less recirculation of material and consequently pan loft capacity has increased. Due to the better type of

grain produced, the efficiency of the curing station has risen. An economy of both steam and labour, is thereby effected and there is also less capital locked up in unmarketed sugar.

Considering the specific advantages of the different systems, the Java is responsible for better recoveries than those obtained by the string proof method. But it has disadvantages:- syrup is used, the grain is rather irregular and there is a tendency towards conglomeration, also a certain amount of recirculation is necessary. It is claimed that the Webre system and the Gomez modification overcome these objections and partially exhausted molasses is kept moving forward much more readily. From the point of view of British West Indian factories, which have not the advantages of expensive mechanical circulation in their pans, the Gomez modification is of especial interest.

Ryle-Davies (3) showed that without mechanical circulation in a pan it is not possible to operate Webre's system successfully. He outlined (theoretically) a most attractive modification of Webre's system in which the advantages of mechanical circulation are retained. He suggested the use of a crystallizer-type vessel equipped with stirrers and heating and cooling elements. Close supersaturation control would be possible and A molasses (after concentration in a pan) could be seeded external to the pan to produce acceptable footings for low grade strikes. The big advantage is the relatively low cost of the installation.

Bradshaw and Fitzwilliam (4), working on this suggestion, used icing sugar to seed A molasses of 60 Suc./Ref. purity in a magma mixer. As a result of their experiments they concluded that the preparation of footings for low grade strikes by stirring A molasses external to the pan was a feasible proposition. However, while fairly acceptable footing could be thus prepared by seeding, they were of the opinion that graining would offer better chances of success - the advantages over seeding being better crystal form and lower conglomerate content of the footings.

The object of this investigation is to produce a low grade footing along the lines suggested by Ryle-Davies, Bradshaw and Fitzwilliam, using however a graining instead of a seeding technique.

It is therefore an attempt to combine, in a manner acceptable to B.W.I. factories, Webre's idea of circulation with Gomez' idea of graining A molasses.

As factories attempting to use the Gomez system have encountered difficulties, notably in connection with grain size, it would appear that the work should be carried out along two main lines:-

1. The determination of the optimum purity zone for graining, while retaining a molasses type of grain.
2. The development of a technique which would ensure the adequate growth of nuclei during the preparation of any footing.