OBSERVATIONS ON ROTORVANE MANUFACTURE

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I would mention that I am no authority on Rotorvane manufacture and that my experience is limited to one 8" machine operating in the Kirkoswald Group factory (4200 ft) in the Dickoya District. However, at the request of the Institute, I have written this article with the proviso that the opinions expressed, even if correct, do not necessarily apply "next door", let alone to other districts.

Installation

To avoid muddled thinking where best to site the Rotorvane in the rolling room, it is necessary to have a clear understanding of the advantages and disadvantages of the factors affecting this consideration.

These are —

(*a*) The stage at which it is to be used in the rolling programme.
(*b*) If it is to be fed by conveyor direct from a rollbreaker.
(*c*) If a conveyor is required from the point of discharge to a rollbreaker.
(*d*) If it is to work independently of conveyors from and to rollbreakers.

I do not think too much importance need be attached to (*a*) since the programme should be altered from time to time to suit the degree of quality in the leaf.

A combination of (*b*) and (*c*), *i.e.* conveyor belts from and to rollbreakers, appears at first sight to be ideal, but in actual practice it is doubtful if any real advantage is gained by such a layout. In the first place, intakes and outputs of Rotorvanes and rollbreakers do not match, and, in the second, it is not always desirable, for reasons explained later, to rollbreak the leaf of earlier 'passes' immediately it has been discharged from the Rotorvane. These difficulties can, however, be overcome, but the expense in doing so seems hardly justified, especially as any saving in labour that might result would be quite negligible.

It seems, therefore, that an installation as in (*d*) with the machine working independently of rollbreakers is quite adequate. It is certainly more straightforward, and in a large factory with several rollbreakers it allows programmes to be more flexible.

Feed

If it is decided to site the Rotorvane regardless of programmes, then the only consideration is to put it in a position where the leaf can be fed to it, and collected after passing through it, as conveniently as possible. An even feed, preferably by conveyor, is essential, and if not maintained the appearance of the made tea is likely to suffer. For the same reason the feed should be continuous and sufficient to keep the cylinder tightly packed throughout its length, even when no pressure is being applied. To achieve this effectively, the trickle feed from the conveyor has to be 'tumbled' in the hopper by a wooden batten or some such means to assist the propelling action of the worm on the rotor shaft. The procedure however is laborious and could, of course, be done better by a mechanical device.

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As a matter of secondary importance, output rises appreciably when the leaf is 'tumbled' in the hopper.

Speed and Pressure

The importance of the correct combination of speed and pressure under varying conditions cannot be emphasized too strongly, both with regard to appearance and liquor. For instance the suggested speed of 35 rpm certainly did not suit conditions in our factory, and it was not until this was reduced to 25 rpm that encouraging results were obtained.

Experimenting with different speeds when pulleys may take up to 15 minutes, to change is wholly unsatisfactory. It can also be very misleading, as true comparisons of samples covering this time-lag cannot be made. The solution seems to be a variable speed gearbox, which, apart from assisting early stages of experimental work very considerably, allows for instant adjustment of speed and pressure to suit varying degrees of wither and different programmes. Results here have shown that a higher speed can be used for a soft wither than for a hard wither. They also show, contrary to opinions expressed elsewhere, that it is the higher speed that tends to spoil appearance.

Pressures

The new Iris End Plate is robust and efficient in operation, but it is thought that a more even distribution of pressure throughout the length of the cylinder would result by replacing a limited number of the existing vanes with the reverse pitch type. These reverse pitch vanes are expected to become available shortly.

As in the case of speeds, pressures can be adjusted with advantage to suit varying conditions, but there is perhaps a tendency to use more pressure than is really necessary. This should be resisted as it spoils 'appearance' especially in the case of soft withers, and adds but little if anything to 'strength'.

Rolling Programmes

Extensive experimental work is necessary to decide at which stages the leaf had best be passed through the Rotorvane. So far as I am aware all are agreed that a conditional roll is preferable, but thereafter it becomes a matter for each estate to select the programmes best suited to its particular set of circumstances and the seasons of the year.

The main alternatives that arise are (*a*) after which orthodox roll is the leaf to pass through the Rotorvane and (*b*) when should dhool be extracted. These are very controversial points and quite naturally will vary from factory to factory, but, so far as (*a*) is concerned, I am inclined to the view that when there is good quality in the leaf, the earlier the leaf is passed through the Rotorvane the better. When these conditions prevail, I also think that in the case of (*b*) dhool can be extracted in the early stages of the programme with advantage.

Rollbreaking

Since the discharged leaf of the earlier passes is very sticky, it is necessary for it to remain undisturbed for anything up to say 5 minutes before rollbreaking, to allow the juice to be absorbed. If this is not done meshes become clogged, and dhool is reduced to the extent that it had best not be extracted prior to the ensuing orthodox

roll. It is at this stage that the use of the Ball-Breaker cum Aerator has been recommended to facilitate rollbreaking, but, although I have no experience of this equipment, it may well overcome the stickiness by drying out the juices that should be absorbed. If this is actually what takes place, then loss of quality and a browner more flaky tea would almost certainly result especially in the case of the earlier dhools.

This 5-minute delay from point of discharge to rollbreaker is unfortunately a formidable problem in any continuous feed operation, and more or less rules out the simple conveyor belt system. If it can be overcome, the trickle feed should then be confined to, say an 18" strip down the rollbreaker to maintain the necessary thickness of spread to avoid an uneven wiry dhool.

Fermentation

Because leaf cells are ruptured and juice is expressed in a matter of minutes, fermentation is quicker than after orthodox rolling. Adjustments in the programme have therefore to be made, and the shorter period of fermentation is conducive to bright liquors and infusions, especially when there is good quality in the leaf. Over-fermentation on the other hand results in more pronounced loss of quality and 'browner' tea, than in the case of orthodox dhools.

It has been found in India that oxygen injected into the rotorvane cylinder while the leaf is being processed accelerates fermentation. I understand that to do so would cost in the region of ten cents per pound of made-tea and it cannot by any means be assumed that this further advance in the fermentation would suit the type of manufacture carried out in Ceylon.

Grading

Generally speaking, leaf grades must be extracted prior to rotorvane passes. The output of B.O.P. and B.O.P.F. tends to increase. In Assam it is considered that the fluting of vanes—a longitudinal groove cut in the front and rear face of each vane—improves appearance, but this has made no difference that can be detected in our factory.

Conclusions

The processing action of the Rotorvane is such that it is hardly likely to turn out a better made tea, but, with a good average standard of leaf, good withers, and correct application of speed and pressure, it can produce one almost similar. On the other hand, given these essentials with programmes adjusted to suit varying conditions, I believe it can without doubt produce teas with better liquors.

In conclusion, I would repeat that these observations are based on my limited experience of only one set of conditions.