# REPORT OF COMMITTEE ON MILLING MACHINERY AND PRACTICE

Owing to the members of this Committee being tied up with their respective duties, nothing much has been done this past year except attend the Chaka's Kraal Soft Cane Test Run, and to try and get some preliminary data together. Questionnaires were issued to get particulars of the various milling plants, as to size, grooving, speed, settings, hydraulic loads, etc., and a very gratifying response has been made, and these particulars are listed in Sheet 1.

The Committee feel that with the co-operation of all the mills, a general improvement in this department can be made. We have a hard and untractable cane to deal with and while our milling plants are up-to-date and kept in very good condition, it is felt that extraction might be improved by attention to grooving, settings, loads and speeds. The average moisture in bagasse is very high, the Experiment Station summary gives it as 51.96 for 1935 season, and if we can get this down to 47 or 48 per cent. it would help the extraction, and also improve the fuel for the boilers.

Reducing the moisture from 52 to 48 should raise the extraction 0.37 per cent. and raise the gross fuel value from roughly 4032 B.T.U.'s to 4368 B.T.U.'s, a difference of 336 B.T.U.'s, which at a boiler thermal efficiency of 60 per cent., would give an additional 0.21 lbs. of steam per lb. of bagasse.

To get a comparison of the settings of the various mills, we have considered that to base the openings on the quantity of fibre passing per minute is the most reasonable way, and in Sheet 2, we have shown the openings as cubic feet per ton of fibre passing per minute as follows:—

$$\frac{\text{opening of rollers in inches} \times \text{length of roller in inches}}{144} = \text{square feet of opening}$$

$$\text{cubic feet per minute of opening} = \text{square feet of opening} \times \text{mean speed of rollers in feet}$$

$$\text{cubic feet per ton of fibre per minute} = \frac{\text{cubic feet per minute of opening}}{\text{Tons of fibre per minute}}$$

We have plotted these openings on a graph, Sheet 3, for the various mills, and these give an excellent picture of what is happening at the various mills. The graph is plotted with the cubic feet per ton of fibre per minute as the abscessae and the rollers passed as ordinates.

With regard to feed openings, you will observe that for 2 rollers (crushers) two of the plants have much smaller openings than the others. These are zig-zag type. It is to be noted that comparing zig-zag and Krajewski openings, to get the same area, the size from the bottom of the teeth to bottom of groove must be greater for zig-zag crushers and may give one the false impression that zig-zag crushers require greater openings, when the reverse is the case.

We would next draw your attention to the 2nd crusher (4 rollers), and note the small opening these have compared with the 1st mill (5 rollers). You will then note that milling plants with a small number of rollers, 11, 13 and 14 rollers have much closer settings than the longer trains. It means that the smaller trains have to get down to better settings than the longer trains, which depend more on the larger number of rollers to get the extraction. From this graph it appears that the larger milling trains should tighten up their feed openings.

With regard to the bagasse openings, these come out much closer, and an average curve through these would be a good guide for anyone setting his milling plant.

With regard to the high moistures, these do not appear to be effected by ordinary speeds. The two mills with the lower moistures have finer grooving than the others.

Mr. Bihl states that increasing the grooving from ⅜in. to 1in. increased the moisture from 50 to 52 per cent., but he put on chevrons to stop slip, and reduced the moisture to 51 per cent. He also states that when running the mills slow, re-absorption took place at 14 ft. per minute, and at 27 feet per minute the moisture rose from 50 to 52 per cent. We would like to draw your attention to the close setting of the 2nd crusher, and also the setting of the Verulam mill which has given good extraction. The feed opening is three times the bagasse opening and is very large, but their bagasse opening appears, according to the graph, to be a fairly close setting although it appears to us that the last mill might have been closer. The difference between the feed and bagasse openings means the mill is slightly unbalanced and will give a greater pressure on the bagasse roller and be more like a two roller crusher and may account for the high extraction. We have all been trying to get a better balance between the feed and bagasse rollers and we may be wrong. It may be better to use the feed as a pusher and put all the load on the last roller. It would be interesting if a mill was tried out to prove which way gives the better extraction.

We have made a start at analysing our mills, and we hope by next year that the Committee will find the time to develop the work now begun, and they welcome any assistance and figures.

## SHEET II.

| Mill Setting. | Empangeni. | Umzimkulu. | Esperanza. | Illovo. | Verulam. | Gledhow. | Doornkop. |
|---|---|---|---|---|---|---|---|
| Feed opening in cubic feet per ton of fibre per minute:— | | | | | | | |
| 1st crusher .. .. | 114 | 83.2 | 128.3 | 227.0 | 119.0 | 145.5 | 84.2 |
| 2nd crusher .. .. | 84.2 | — | — | — | — | — | 25.0 |
| 1st mill .. .. .. | 120 | 146.0 | 134.5 | 131.4 | 155.0 | 177.9 | 99.5 |
| 2nd mill .. .. .. | 66 | 112.0 | 142.4 | 127.0 | 166.0 | 97.9 | 60.7 |
| 3rd mill .. .. .. | 61 | 48.0 | 128.0 | 128.7 | 102.0 | 88.5 | 50.2 |
| 4th mill .. .. .. | 63 | — | 115.9 | 124.3 | 96.6 | 65.1 | — |
| 5th mill .. .. .. | 95 | — | 115.9 | — | 100.0 | — | — |
| 6th mill .. .. .. | 94 | — | — | — | — | — | — |
| Bagasse opening in cubic feet per ton of fibre per minute:— | | | | | | | |
| 1st mill .. .. .. | 56.6 | 67.3 | 93.5 | 41.1 | 54.5 | 71.1 | 46.6 |
| 2nd mill .. .. .. | 30 | 29.7 | 95.0 | 54.4 | 41.1 | 35.6 | 36.8 |
| 3rd mill .. .. .. | 25 | 4.8 | 90.1 | 59.4 | 34.0 | 44.25 | 36.1 |
| 4th mill .. .. .. | 17 | — | 66.8 | — | 36.8 | 5.42 | — |
| 5th mill .. .. .. | 40 | — | 89.0 | — | 33.3 | — | — |
| 6th mill .. .. .. | 38 | — | — | — | — | — | — |

| Mill Setting. | Darnall. | Amatikulu. | Felixton. | Umfolozi. | Sezela. | |
|---|---|---|---|---|---|---|
| Feed opening in cubic feet per ton of fibre per minute:— | | | | | | |
| 1st crusher .. .. .. .. | — | 137.8 | 121.3 | 85.8 | 125.0 | 141.5 |
| 2nd crusher .. .. .. .. | — | 94.4 | 102.4 | — | — | — |
| 1st mill .. .. .. .. .. | 50.2 | 145.2 | 163.5 | 134.0 | 98.3 | 115.0 |
| 2nd mill.. .. .. .. .. | 43.0 | 137.4 | 158.9 | 67.2 | 81.0 | 95.0 |
| 3rd mill.. .. .. .. .. | 33.8 | 121.3 | 152.0 | 131.2 | 93.3 | 109.5 |
| 4th mill.. .. .. .. .. | 24.2 | 84.7 | 149.0 | 115.5 | 107.0 | 125.3 |
| 5th mill.. .. .. .. .. | — | — | 140.0 | 102.0 | — | — |
| 6th mill.. .. .. .. .. | — | — | — | 94.0 | — | — |
| Bagasse opening in cubic feet per ton of fibre per minute:— | | | | | | |
| 1st mill .. .. .. .. .. | 25.1 | 64.5 | 76.2 | 59.5 | 61.4 | 76.6 |
| 2nd mill.. .. .. .. .. | 20.3 | 33.4 | 67.2 | 59.7 | 31.5 | 36.9 |
| 3rd mill.. .. .. .. .. | 13.28 | 42.0 | 62.5 | 92.6 | 41.4 | 48.7 |
| 4th mill.. .. .. .. .. | 8.45 | 40.4 | 53.9 | 38.6 | 16.9 | 19.75 |
| 5th mill.. .. .. .. .. | — | — | 46.7 | 27.5 | — | — |
| 6th mill.. .. .. .. .. | — | — | — | 19.6 | — | — |

Mr. MURRAY: There is not very much I can add. This Report has entailed an enormous amount of work, in a very short time and the more the graphs are studied the more one gets out of them. If each engineer studies the graph, it will give him a good guidance as to how his settings are, and if he goes into the figures of his own mill he will get a good comparison.

Mr. WILSON: Asked Mr. Murray to give examples of one or two Mills.

Mr. MURRAY: Took Verulam and gave the particulars from the graph on the blackboard. Following on Verulam Mr. Murray took Sezela as an example.

Mr. WILSON: You think the openings are largely responsible for the moisture in bagasse we get in this country—that appears to bear out Mr. Macbeth's statements this morning.

Mr. MURRAY: Sezela has two Milling Plants and you will notice the curves are very good and follow one another. I do not know if Mr. Macbeth is quite correct.

Mr. PORTEOUS: Can Mr. Murray give us a long train mill?

Mr. MURRAY: The long trains have all big openings. Short trains have all small openings. Surely all feed and bagasse openings should fall to one common line. They are all over the place. I feel this thing very strongly, that, for any Committee, it is impossible to analyse the whole of the openings for all the mills. Somebody has got to be put on the job to analyse them. This took a fortnight's work. I think somebody should be appointed to collect that data.

Mr. WILSON: You can make a recommendation.

Mr. MURRAY: The gain to be got from a close study of milling is very great. Taking the total crop as 460,000 tons of sugar at £11 per ton and a Boiling House recovery of 85%, a rise in Extraction of half a per cent. means a gain of £21,505. We feel that by careful study of our settings, groovings, etc., that half a per cent. rise in Extraction is not beyond our power, also, it is necessary to study the milling of the new canes and I propose that a strong and active Committee be appointed to handle this section and as it entails an enormous amount of detail calculations, etc., that a Technical Assistant be permanently put on this duty to work under the Milling Committee and be attached to the Experiment Station. It would be his doty to visit the various mills and get particulars of the plants and settings and with the Committee get down to basic settings, etc.

Mr. President, I move that this matter be strongly taken up by the new Council with our Godfathers the Natal Sugar Millers Association and point out to them the necessity and advantages to be gained by all, by undertaking this work. It also is in agreement with your able address yesterday, as the Milling Committee and the Assistant would be the Efficiency Department.

Mr. WILSON: Do you wish that to go forward to the Council, Mr. Murray?

Mr. MURRAY: Yes.

Mr. RAULT: I should like very much to second what Mr. Murray has said, for it is in agreement with what you were telling us yesterday in your Presidential address. From studying these graphs one can see something is still missing. It is the work of the individual units. It is very nice to see the settings coming in that way, but to know whether the mill setting is good or not, we should consult the chemist. We already possess a method, so I suggest that a large number of mills, or even all of them should adopt a method and at the end of a year, we would be in possession of facts which could be collected. This is not the work of one man, and therefore a suggestion of pushing ahead is quite sound.

The President then put the motion to the meeting which agreed to it unanimously.

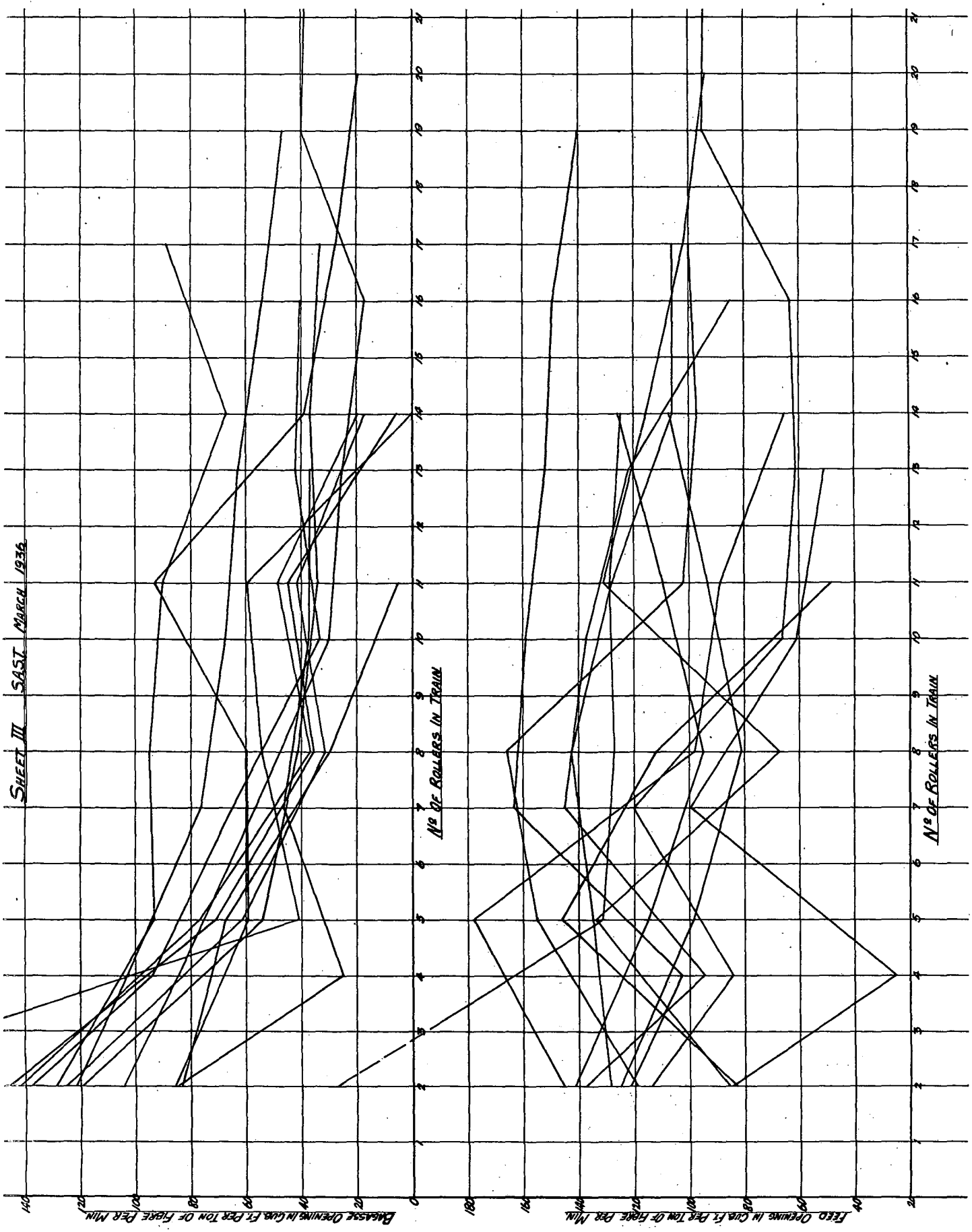
Mr. RAULT: Referred to the example given on the graph. We do not know the performance of these mills unless these figures are backed by Extraction figures. I think there are four mills which could give you these Extractions. You could make that chart still more explicit and more interesting.

Mr. Murray: With regard to your remarks about Extraction, some of them were good enough to give me the figures, but to list and analyse them all is a tremendous amount of work.

Mr. BIJOUX: All this calculation was based on cubic feet of fibre per hour, I was wondering whether it would not be better to base it on the actual volume of Bagasse, which on ordinary test, is taken as being 43%. When you apply maceration before it reaches the third mill the Engineer sets his Mill accordingly. The amount of maceration on top of that brings it to 75.

Mr. MURRAY: With regard to maceration I do not think it has much effect. It does not affect the Bagasse opening, but I agree that it may affect the feed opening.

Mr. BIJOUX: It surely would make a difference. Assuming you were crushing 100 tons of cane an hour and you set your opening to 43 tons of Bagasse and you got 75 tons of bagasse. I am sure the Engineer would be at a loss to find out what is wrong with the mill.


Sheet III SAST March 1936
Bagasse Openings in Cub. Ft. per Ton of Fibre per Min.
Nº of Rollers in Train
Feed Openings in Cub. Ft. per Ton of Fibre per Min.
Nº of Rollers in Train

## — S.A.S.T. MARCH 1936 SHEET I —

| Particulars Of Milling Plant | Umzimkulu | Empangeni | Esperanza | Illovo | Verulam | Gledhow | Doornkop | Darnall | Amatikulu | Felixton | Umfolozi | Sezela | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tons Of Cane Crushed Per Hour | 25·86 | 79·75 | 44·25 | 49·88 | 33·82 | 50·58 | 24 to 25 | 88·52 | 63·05 | 70·76 | 34·35 | 47 | 40 |
| Sucrose % Cane | 12·97 | 13·085 | 13·86 | 13·56 | 14·37 | 13·52 | 13·78 | 13·46 | 13·49 | 12·98 | 12·80 | 13·18 | 13·18 |
| Fibre % Cane | 15·46 | 16·51 | 16·76 | 15·63 | 15·22 | 15·44 | 16·82 | 15·50 | 16·03 | 15·25 | 16·39 | 17·31 | 17·31 |
| Sucrose % Bagasse | 4·15 | 2·60 | 3·38 | 3·83 | 2·93 | 3·93 | 4·24 | 3·98 | 3·8 | 3·35 | 3·47 | 3·51 | 3·51 |
| Moisture % Bagasse | 51·47 | 53·74 | 51·23 | 53·12 | 50·16 | 50·67 | 47·6 | 52·45 | 54·05 | 54·88 | 50·31 | 48·87 | 48·87 |
| Fibre % Bagasse | 43·40 | 42·78 | 44·18 | 42·09 | 46·24 | 43·78 | 47·35 | 42·47 | 41·17 | | 43·49 | 46·69 | 46·69 |
| Inhibition % Cane | 31·01 | 37·08 | 35·03 | 37·69 | 35·06 | 31·67 | 30·3 | 33·29 | 29·34 | 28·92 | 27·49 | 29·41 | 29·41 |
| Extraction | | | | | | | | | | | | | |
| Cane Knives | | | | | | | | | | | | | |
| Dia. Over Blades (ins) | 44 | 51 | 38 | 54 | 36 | 1st Set 2nd Set 38 36 | 48 | 48 | 78 | 1st Set 2nd Set 59 66 | 54 | 1st Set 2nd Set 47 50 | 1st Set 2nd Set 47 50 |
| Number Of Blades | 28 | 36 | 22 | 16 | 22 | 34 24 | 18 | 15 | 13 | 24 14 | 64 | 20 24 | 20 24 |
| Depth From Tip Of Blade To Cane Carrier Slat (ins) | 4¾ | 18 | 6 | 6 | 2½ | 12 2¼ | 5 | 3 | 5 | 6 18 | 10 | 3 2¼ | 3 2¼ |
| Brake Horse Power | 50 | 110 | 100 | 51 - 60 | | 150 130 | 35 | 250 | 25 To 50 | 100 | 150 | 50 100 | 50 100 |
| Revolutions Per Minute | 550 | 600 To 900 | 460 | 438 | 600 | 580 580 | 500 | 500 | 290 | 575 450 | 700 | 400 480 | 400 480 |
| Shredder | | | | | | | | | | | | | |
| Dia. Over Hammers (ins) | | | | | | | | | | | | | |
| Number Of Hammers | | | | | | | | | | | | | |
| Brake Horse Power | | | | | | | | | | | | | |
| Revolutions Per Minute | | | | | | | | | | | | | |
| First Crusher | | | | | | | | | | | | | |
| Type | Zig Zag | Fulton | Krajewski | Krajewski | Krajewski | Krajewski | Zig Zig | Fulton | Krajewski | Fulton | Krajewski | Mackie Splitter | Krajewski |
| Pitch Of Groove (ins) | 5 | 3¼ | 6" | 17 | | | 5·4 | 3½ | | | | 3½ | |
| Dia. Over Teeth (ins) x Length Of Roller (ins) | 25¼ x 36 | 36½ x 66 | 27 x 66 | 32 x 70 | 24 x 48 | 28 x 60 | 28 x 54 | 33 x 60 | 34 x 66 | 33 x 66 | 32 x 66 | 31½ x 64 | 33 x 64 |
| Dia. At Root Of Teeth (ins) | 22 | 30⅞ | 23 | 27 | 20¾ | 25 | 24 | 28½ | | 29 | 27 | | |
| Opening Top Of Teeth To Root Of Teeth (ins) | 1¼ | 1¾ | ⅞ | 2½ | ¾ | ⅞ | ⅜ | 1⅛ | 1⅛ | 1¼ | 1½ | 2⅛ | 1⅝ |
| Brake Horse Power | | | | | | | | | | | | | |
| Revolutions Per Minute | 3·15 | 3·53 | 3·25 | 2·25 | 3 | 3·5 | 2·625 | | 90 To 110 | 4·25 | 2·22 | 2·3 | 2·365 |
| Second Crusher | | Fulton | | | | | Splitter | Fulton | Splitter | Fulton | | | |
| Type | | 2¼ | | | | | 1½ | 2⅜ | 2½ | | | | |
| Pitch Of Groove (ins) | | 35½ x 66 | | | | | 27⅜ x 54 | 30⅜ x 60 | 34 x 66 | 33 x 66 | | | |
| Dia. Over Teeth (ins) x Length Of Roller (ins) | | 32½ | | | | | 24 9/16 | 27¾ | 30¼ | 30 | | | |
| Dia. At Root Of Teeth (ins) | | 1 3/16 | | | | | ⅜ | 1⅛ | 1 3/16 | 1 3/16 | | | |
| Opening Top Of Teeth To Root Of Teeth (ins) | | & 3·46 | | | | | 30 & 3·597 | | - & 3·55 | - & 3·38 | | | |
| Brake Horse Power And Revolutions Per Minute | | | | | | | | | | | | | |
| First Mill | | | | | | | | | | | | | |
| Dia. Of Rolls Over Teeth (ins) | 28 | 34 | 33 | 32 | 26 | 32 | 27½ | 30½ | 34¼ | 34 | 32 | 32½ | 32½ |
| Dia. Of Roller At Root Of Teeth (ins) | 26·2 | 29½ | 30¼ | 30 | 23¼ | 29⅜ | 25 9/16 | 28½ | 31¼ | 32 | 30 | 30 | 30 |
| Pitch Of Grooving (ins) | 1 | 2 | 1¼ | 1½ | 1¼ | 1⅛ | 1 | 1 | 1½ | 1 3/16 | 1½ | 1½ | 1½ |
| Length Of Roller (ins) | 56 | 66 | 66 | 72 | 48 | 66 | 54 | 60 | 66 | 66 | 66 | 66 | 66 |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | 1⅜ | 2⅜ | 1¾ | 2 | 2¼ | 2¼ | 1 | 1⅜ | 2¼ | 2⅜ | 2⅛ | 1½ | 1½ |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | ⅜ | 1⅛ | 1 1/32 | ⅜ | ⅜ | 1 | 1 7/32 | 11/16 | 1 | 1 3/32 | 1 | 1 3/16 | 1 |
| Trash Turner Opening At Centre - Turner To Top Of Teeth (ins) | 2⅛ | 2⅛ | 2½ | 2 | 2 | 2⅜ | 1⅛ | 2⅜ | 3 | 3¾ | 2½ | 2⅛ | 2⅜ |
| Hydraulic Load On Rollers - Short Tons | 220 | 350 | 300 | 139 | 120 | 250 | 150 | 200 | 377 | 300 | 169·7 | 400 | 400 |
| Brake Horse Power | | | | | | 150 | 60 | | | | | | |
| Revolutions Per Minute | 2·6 | 2·9 | 2·3 | 2·109 | 2·3 | 2·3 | 2·625 | 2·6 | 2·6 | 2·63 | 2·31 | 2·365 | - |
| Speed Of Carrier Feeding Mill (ft/min) | 22 | 28·6 | 20 To 25 | 16 | | - | 19·3 | 25 | - | 23·36 | 18 | - | - |
| Type Of Carrier Feeding Mill | Slat | Apron | | | | - | Scraper | Apron | - | Apron | Apron | - | - |
| Chevrons - No And Depth (ins) | 8 - ½ | Top 12 - 1 3/8 | Feed & Top 13-1 | Feed 7, Top 14 | F. 12-1¼ T. 12-1¼ | Top 13 - ⅞ | Top 8 - ¾ | Top 15 - ¾ | Top 12 - ⅞ | Top 12 - ¼ | None | None | Top & Feed 12 |
| Are Pushers Used ? | No | No | No | Yes | Yes | Yes | No | No | Yes | Yes | No | No | Yes |
| What Maceration Used Before This Mill | Simple | ½ 3 Mill Juice | None | None | - | None | All 2 Mill Juice | None | All 2 Mill Juice | All 2 Mill Juice | None | None | None |
| Second Mill | | | | | | | | | | | | | |
| Dia. Of Roller Over Teeth (ins) | 28 | 33 | 33 | 33⅜ | 24⅛ | 32 | 25 | 30 7/16 | 33⅜ | 34 | 32¼ | 32½ | 32½ |
| Dia. Of Roller At Root Of Teeth (ins) | 26·2 | 30 11/16 | 30¾ | 31½ | 23 11/16 | 29⅜ | 23⅜ & 24⅛ | 28 7/16 | 31¾ | 32 | 29 9/16 | 30⅛ | 30⅛ |
| Pitch Of Grooving (ins) | 1 | 1 | 1 | ¾ | ¾ | 1⅛ | Feed / Others ½ | 1 | 1 | ⅞ | 1½ | 1 | 1 |
| Length Of Roller (ins) | 56 | 66 | 66 | 72 | 48 | 66 | 54 | 60 | 66 | 66 | 66 | 66 | 66 |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | 1 | 1¼ | 1⅞ | 1 13/16 | 1⅜ | ⅜ | 25/64 | 1⅛ | ⅜ | 2 11/16 | 1⅞ | 1⅞ | 1⅞ |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | ⅜ | 3/16 | 1¼ | ¾ | ⅜ | ⅛ | 1 11/32 | ⅞ | ⅜ | 1 11/32 | 1¼ | 1 1/16 | 1 1/16 |
| Trash Turner Opening At Centre - Turner To Top Of Teeth (ins) | 1⅞ | 2 11/16 | 2½ | 2 | 2 | 2½ | 1 11/16 | 2½ | 2¾ | 3 1/16 | 2½ | 2½ | 2½ |
| Hydraulic Load On Roller - Short Tons | 220 | 350 | 300 | 233 | 120 | 230 | 150 | 175 | 296 | 270 | 141·83 | 400 | 400 |
| Brake Horse Power | | | | | | 150 | 60 | | | | | | |
| Revolutions Per Minute | 2·7 | 3·04 | 2·45 | 2·226 | 2·75 | 2·5 | 3 | 2·7 | 2·7 | 2·88 | 2·29 | 2·38 | 2·38 |
| Speed Of Carrier Feeding Mill (ft/min) | 24 | 24·7 | 20 To 25 | 16 | | 22 | 22·25 | 26·1 | 21 | 25·6 | | 25 | 25 |
| Type Of Carrier Feeding Mill | Scraper | Apron | Apron | Apron | Apron | Apron | Scraper | Apron | Scraper | Scraper | Scraper | Apron | Apron |
| Chevrons - No And Depth | 8 - ½ | None | Feed & Top 13-1 | F. 7-1 T. 14-1 | Top 12 - ⅜ | Top 13 - ⅞ | Top 12 - ½ | Top 15 - ¾ | Top 12 - ⅞ | Top 14 - ½ | Top 10 - ⅞ | None | None |
| Are Pushers Used ? | No | No | No | No | Yes | Yes | No | No | Yes | Yes | Yes | No | No |
| What Maceration Used Before This Mill | Simple | ½ 3 Mill Juice | None | - | - | All 2 Mill Juice | All 3 Mill Juice | None | All 3 Mill Juice | All 3 Mill Juice | None | None | None |
| Third Mill | | | | | | | | | | | | | |
| Dia. Of Roller Over Teeth (ins) | 28 | 33 | 33 | 33⅜ | 24⅛ | 32 | 25 | 31 | 34 | 34 | 32 | 33 | 32 |
| Dia. Of Roller At Root Of Teeth (ins) | 28·2 | 30 11/16 | 30¾ | 32¼ | 23 11/16 | 30¼ | 24⅛ & 24½ | 29 | 32¾ | 32 | 29 9/16 | 30⅜ & 31 1/16 | 30⅜ & 31 1/16 |
| Pitch Of Grooving (ins) | Feed 1 Others ½ | 1 | 1 | 1 | ¾ | 1 | Feed ⅝ Others ½ | 1 | 1 | ⅞ | 1 | Feed 1 Others ½ | Feed 1 Others ½ |
| Length Of Roller (ins) | 60 | 66 | 66 | 72 | 48 | 66 | 54 | 60 | 66 | 66 | 66 | 66 | 66 |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | 3/16 | 1¼ | 1 11/16 | 1⅞ | 1½ | 7/16 | ⅜ | 1 | 1⅜ | 2⅛ | 2⅛ | 1⅞ | 1⅞ |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | 1/32 | ½ | 1 3/16 | ¾ | ½ | 3/16 | 3/16 | 11/32 | 3/16 | ⅛ | ⅜ | ½ | ½ |
| Trash Turner Opening At Centre: Turner To Top Of Teeth (ins) | 1½ | 2 | 2½ | 2 11/16 | 2⅜ | 2 1/16 | 1 11/32 | 2 1/16 | 2⅜ | 3 | 2⅜ | 2⅞ | 2⅞ |
| Hydraulic Load On Roller - Short Tons | 225 | 400 | 360 | 266 | 120 | 275 | 180 | 180 | 336 | 300 | 203·65 | 380 | 380 |
| Brake Horse Power | | | | | | 200 | 65 | | | | 156 | | - |
| Revolutions Per Minute | 3·23 | 2·81 | 2·45 | 2·35 | 2·8 | 2·75 | 3·27 | 2·7 | 2·8 | 3·15 | 2·39 | 2·93 | 2·93 |
| Speed Of Carrier Feeding Mill (ft/min) | 13·5 | 23·1 | 17 To 20 | 16 | | 22·3 | 24·25 | 27 | 25 | 32 | | 28·4 | 28·4 |
| Type Of Carrier Feeding Mill | Scraper | Apron | Apron | Apron | | Apron | | Apron | Apron | Scraper | Scraper | Apron | Apron |
| Chevrons - No And Depth | 6 - ⅜ | None | | F. 14-1 T. 14-1 | Top 12 - ⅜ | Top 13 - 1½ | 12 - ⅜ | 15 - ¾ | Top 12 - ⅞ | Top 14 - ½ | Top 10 - ⅜ | None | None |
| Are Pushers Used ? | No | No | No | No | Yes | Yes | No | No | No | Yes | No | Yes | Yes |
| What Maceration Used Before This Mill | None | 4" Mill Juice | None | - | - | All 4" Mill Juice | All Water | All 4" Mill Juice | All 4" Mill Juice | All 4" Mill Juice | 8% Water | 12% Water | 12% Water |
| Fourth Mill | | | | | | | | | | | | | |
| Dia. Of Roller Over Teeth (ins) | | 34 | 33 | 34½ | 25 | 32 | | 31 | 35¼ | 34 | 32½ | 33 | 33 |
| Dia. Of Roller At Root Of Teeth (ins) | | 31 11/16 | 30¾ | 32¼ | 23⅜ | 31 | | 29 | 33¾ | 32 | 30⅛ | 30⅜ & 31 1/16 | 30⅜ & 31 1/16 |
| Pitch Of Grooving (ins) | | 1 | 1 | 1 | ¾ | ½ | | 1 | 1 | ⅞ | 1 | Feed 1 Others ½ | Feed 1 Others ½ |
| Length Of Roller (ins) | | 66 | 66 | 72 | 48 | 66 | | 60 | 66 | 66 | 66 | 66 | 66 |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | | 1⅜ | 1⅜ | 1½ | 1 3/16 | ¾ | | ⅝ | 1⅛ | 1 1/16 | 1 1/16 | 1 1/16 | 1 1/16 |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | | 3/16 | 1/16 | - | ½ | 1/16 | | 1/32 | 3/16 | 11/32 | 3/16 | 3/16 | 3/16 |
| Trash Turner Opening At Centre: Turner To Top Of Teeth (ins) | | 2 | 2½ | 2 11/16 | 1⅜ | 2¼ | | 2 1/16 | 2½ | 2 1/16 | 2¼ | 2⅜ | 2⅜ |
| Hydraulic Load On Roller - Short Tons | | 350 | Toggle | 266 | 120 | 275 | | 200 | 390 | 350 | 287·6 | 380 | 380 |
| Brake Horse Power | | | | | | 200 | | | | | 160 | | |
| Revolutions Per Minute | | 2·95 | 2·3 | 2·47 | 3 | 3 | | 2·7 | 3·1 | 3·63 | 2·56 | 3·19 | 3·19 |
| Speed Of Carrier Feeding Mill (ft/min) | | 24 | 17 To 20 | 16 | | 23 | | 27 | 29 | 32·25 | | 30·9 | 30·9 |
| Type Of Carrier Feeding Mill | | Apron | Apron | Apron | Apron | Apron | | Apron | Apron | Apron | Scraper | Apron | Apron |
| Chevrons - No And Depth | | None | - | F. 7-1 T. 14-1 | Top 12 - ⅜ | None | | Top 12 - ¾ | Top 12 - ½ | Top 14 - ½ | Top 10 - ⅜ | None | None |
| Are Pushers Used ? | | No | No | - | Yes | Yes | | No | No | Yes | Yes | Yes | Yes |
| What Maceration Used Before This Mill | | 5" Mill Juice | - | - | - | All Water | | All Water | 29·35% Ar. Inb. | All 5" Mill Juice | Tom Juice 38&M | 17% Water | 17% Water |
| Fifth Mill | | | | | | | | | | | | | |
| Dia. Of Rollers Over Teeth (ins) | | 37½ | 33 | | 25 7/8 | | | | 34 | 32½ | | | |
| Dia. Of Roller At Root Of Teeth (ins) | | 35 11/16 & 36 5/16 | 30¾ | | 24½ | | | | 32 | 30½ | | | |
| Pitch Of Grooving (ins) | | 1 Feed Others ½ | 1 Feed Others ½ | | ¾ | | | | ⅞ | 1 | | | |
| Length Of Rollers (ins) | | 84 | 60 | | 48 | | | | 66 | 66 | | | |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | | 9/16 | 1⅜ | | 1 5/16 | | | | 1½ | 1⅜ | | | |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | | 11/32 | 1¼ | | 11/16 | | | | ½ | 11/16 | | | |
| Trash Turner Opening At Centre: Turner To Top Of Teeth (ins) | | 1 11/16 | 2¼ | | 1⅝ | | | | 2⅜ | 2⅛ | | | |
| Hydraulic Load On Roller - Short Tons | | 590 | Toggle | | 120 | | | | 350 | Toggle | | | |
| Brake Horse Power | | 300 | | | | | | | | | | | |
| Revolutions Per Minute | | 3·42 | 2·3 | | 3 | | | | 4·12 | 2·4 | | | |
| Speed Of Carrier Feeding Mill | | 32·3 | 17 To 20 | | | | | | 36·66 | | | | |
| Type Of Carrier Feeding Mill | | Apron | Apron | | Apron | | | | Apron | Apron | | | |
| Chevrons - No And Depth | | None | - | | Top 12 - ⅜ | | | | Top 14 - ½ | None | | | |
| Are Pushers Used ? | | No | No | | Yes | | | | Yes | No | | | |
| What Maceration Used Before This Mill | | 6" Mill Juice | - | | - | | | | 28·92% Water | 10% Water | | | |
| Sixth Mill | | | | | | | | | | | | | |
| Dia. Of Roller Over Teeth (ins) | | 37½ | | | | | | | | 32½ | | | |
| Dia. Of Roller At Root Of Teeth (ins) | | 35 11/16 & 35 5/16 | | | | | | | | 30½ | | | |
| Pitch Of Grooving (ins) | | Feed Others ½ | | | | | | | | 1 | | | |
| Length Of Rollers (ins) | | 84 | | | | | | | | 66 | | | |
| Feed Opening: Point Of Teeth To Root Of Teeth (ins) | | 9/16 | | | | | | | | 1½ | | | |
| Bagasse Opening: Point Of Teeth To Root Of Teeth (ins) | | 1/32 | | | | | | | | ⅜ | | | |
| Trash Turner Opening At Centre: Turner To Top Of Teeth (ins) | | 1⅞ | | | | | | | | 2⅛ | | | |
| Hydraulic Load On Roller - Short Tons | | 590 | | | | | | | | Toggle | | | |
| Brake Horse Power | | 300 | | | | | | | | | | | |
| Revolutions Per Minute | | 3·6 | | | | | | | | 2·4 | | | |
| Speed Of Carrier Feeding Mill | | 34·1 | | | | | | | | | | | |
| Type Of Carrier Feeding Mill | | Apron | | | | | | | | Apron | | | |
| Chevrons - No And Depth | | None | | | | | | | | None | | | |
| Are Pushers Used ? | | No | | | | | | | | No | | | |
| What Maceration Used Before This Mill | | 37% Water | | | | | | | | 9% Water | | | |

Mr. McNICOLL: With regard to the graph that you have prepared, I think you are going to find extreme difficulties in ever getting a line through a group of mills with something that will conform to each other.

In so far as mill settings are concerned, I have listened to what has been said. There is a lot more than mere setting. We have various makes of mills in the country. The angle of feed, and the approach to the feed carrier is of importance. Mill settings generally are brought about in an endeavour to get capacity. Unless you can take mills of a certain design and the application of the carriers to the particular mills you are going to have a tall job. Individual mill tests are the only indication of what should be done to the mill and the only thing to be stuck solidly to.

Mr. MURRAY: To me, setting in various countries depends on the amount of fibre. With regard to carriers, I was of the same opinion as you. I got an eye-opener when I studied this graph. I had to alter my opinion after I found that scraper carrier mills had the same feed openings as apron carrier mills.

Mr. CORDES: I think Mr. Murray has left out an important point, namely, the drainage opening. The opening between the Thrash Plate and the Discharge Roller. If the opening is too small the juice which is inside tends to cause a hydraulic pressure and the juice that is in there has no other way to escape except through the discharger.

Mr. MURRAY: I have to thank Mr. Cordes for bringing up this point. If I had detailed the whole thing I would have been here for another year.

Mr. WILSON: It is a very important point, Mr. Murray.

Mr. SHUKER: There are a lot of things I could say. We have all gone into this question of settings and we have gone into why one mill does better than another, etc., but we have a very fair basis of comparison in these mills—Felixton and Amatikulu. Felixton usually gets a better Extraction than we do and when it comes down to Settings, we, Amatikulu, should be getting an Extraction better than them. Very often when we ring up to find what settings they are getting, we find they are trying the same setting with their mill as ours and they cannot get the quantities.

At Felixton the feed opening of the last mill is 1½in. and at Amatikulu it is 1⅛in. and yet they get a better Extraction and a better moisture. A lot of it has to do with the type of cane. The new variety canes mill easily but if I did not alter the speeds on the engines driving the last three mills I could not get very good crushing but I got a low moisture and the Extraction went up. You can't take one mill and compare it with another, the cane itself has a lot to do with the matter. Mr. Murray has stated that the Scraper type of Carrier is a good type, but in one mill you sometimes find these carriers feed direct into the Mill and others deliver to a feed plate. It is interesting to get these figures and it will be very interesting to get home to put them down in graph form because we can learn a lot from a graph. It certainly is an eye-opener and when we get home and put them down on our graphs they will be very instructive.

Mr. MUNRO: Mr. Chairman, there has not been much discussion on the point of rollers. You have all been trying to get a better balance point between feed and roller, and we may be wrong. Unless wear and tear is excessive I maintain that all rollers are extraction rollers. Now let us have some discussion on that point please!

Mr. SHUKER: I think most of the Engineers these days think all rollers should get Extraction, because you must make your feed roller do its work.

Mr. MURRAY: I was in agreement with you, but I was speaking to Mr. Cordes the other day and he has got a different view of it. When you look into this matter you get two different schools. There are one or two other mills of the same opinion, that is, big feed openings and all the load on the last roller.

Mr. GRANT: Mr. Chairman, I should like to give you some of my experience. There was a 5 mill train and we had a very wide opening. It was so tight that the mill would not turn. The Extraction was 86, for the 5 mill train. The following season all the settings were opened up considerably. As a matter of fact they were ridiculous. The Extraction became 91. The ratio varied from 2½—2.

Mr. POWELL: In regard to mill settings, I have milled cane for many years. At one time when assistant chief engineer of a large Company in Cuba, we tried all sorts of formulae but none of them were satisfactory. The Company's mills were situated all over the Island, and we found that a setting which was good for one set of conditions was no good for another. It boiled down to this, we had to take each tandem separately and find out by trial and error the best settings to suit that particular set of conditions, especially in view of the fact that the different tandems were by different makers. Even in one particular mill, with two identical tandems by the same makers, grinding the same tonnage and the same cane, the settings had to be varied to get the same results. In Cuba we had good milling cane with about 10% fibre, in the Phillipine Islands cane of 10-11% fibre, but again the milling quality of the cane varied. Then in Natal we have Uba with anything from 14-18% fibre, and a hard milling cane at that. Here the situation is complicated by the introduction of soft canes, which owing to climatic and other conditions do not always conform to type. The whole subject is so complicated that I do not think it possible or wise to attempt to lay down a hard and fast formula

for mill settings in this or any other country. Certain general principles can be laid down, but the final settings should be left to the engineer to work out for his particular plant and conditions.

Mr. MUNRO: We are inclined to be a little critical. This is a very excellent effort, but we are facing what is bound to be a critical period in milling and while I agree with one speaker who said individual mill tests are essential, I think many other considerations come into the question as well. I asked just now for a discussion on a particular point about rollers. If we use a balanced mill for instance, the top roller will float perfectly in its housing and there is no need whatever for hardened faces. Lubrication is easy and taking it all over the wear and tear is less. I also thought our friend here, who mentioned his low moisture, got his low moisture because the feed roller was doing its share of the work.

Mr. MURRAY: The only thing I want to say is these things were got out with the intention of trying to help. We all know each mill is different, everything is different, we cannot tie anything down, but this is to give a general indication for the average mill. There was no intention of tying them down to any formula. The whole data was very enlightening to me.

Mr. WILSON: That concludes the discussion on the Milling Committee's Report. I think that the report, although not a great deal of reading matter in it, was very interesting.

If the Council adopts Mr. Murray's recommendation I think that next year we will try to get appointed a strong Milling Committee to take matters up.

I should like you to join me in a very hearty vote of thanks to the Committee for their work.