

INTERIM REPORT ON TECHNICAL EDUCATION (FACTORY)

By J. P. N. BENTLEY, Convener S.A.S.T.A. Education Committee

Historical

From 1928 to 1952 the South African Sugar Technologists' Association operated a training course in sugar technology on behalf of the S.A. Sugar Association. This course led up to the standard of the Finals of the City and Guilds of London's examination in Sugar Technology, but lack of interest eventually resulted in the abandonment of the course. Nevertheless some energetic individuals continued studying and arrangements were made for them to write the City and Guilds examinations. However, in 1957 the City and Guilds stopped conducting examinations in sugar technology and it became apparent that we must follow the lead of every other major sugar producing country and renew our efforts to ensure that our industry received the trained men it required.

In 1958 the S.A.S.T.A. submitted a new training proposal which was accepted by the S.A.S.A. and immediately put into effect. This programme has now been in operation for almost five years and is slowly overcoming the resistance and prejudice which the sugar industry characteristically displays towards innovations.

The first of these courses started in 1959 with twenty-three students. Only eight successfully passed the three four-months theoretical training periods and these eight are now entering the final year of their practical training. All these students have already been absorbed by the companies that sponsored their training.

The second course in 1961 started with twelve students and will finish at the end of 1965 with only five or six successful trainees.

At the beginning of this year a third course of fifteen students was enrolled. This course has a higher proportion of new-comers to the industry and a higher proportion of matriculants than previous courses and it will be interesting to observe the progress these young men make.

From time to time pressure has been exerted on the committee responsible for this training programme to lower the standard but this has always been strongly resisted and in fact the tendency in the future must be to raise the standard as improved efficiency can only be expected where better training and greater knowledge produce a finer understanding of the problems encountered.

As there is apparently a wide divergence of views on what should be and what is being done, it would be as well to detail the programme the education committee envisage.

Object of the Course

To train sugar technologists to the standard of factory overseer, and enable them to control all aspects of sugar manufacture. This includes taking an

active part in diagnosing the causes of day to day difficulties that occur and being able to apply remedial action. The ability to take an intelligent interest in scientific experiments, studies, recommendations or publications is also necessary so that improved techniques can be applied with maximum effectiveness.

Length of Course

It is considered that five years practical training is essential to attain the standard required and we have set out in Appendix "A" the suggested programme that should be followed.

At the same time the student is required to attend the Natal Technical College for three four-monthly theoretical training periods, commencing at the end of January and closing at the end of May each year. On successfully completing the theoretical part of the course, he will be awarded a Certificate in Sugar Technology issued by the Department of Education Arts and Science.

Staff Required at Factories

As it is impossible to allow staff members to be relieved from their normal duties at factories for any length of time without disrupting the standard of process supervision already in existence, it is considered essential that each factory participating in this training scheme should carry at least one staff member supernumerary to its normal requirements.

Standard Required

A matriculation standard with mathematics, physics and chemistry as major subjects is considered necessary. Students with lower educational standards have been accepted in the past, but these have invariably found great difficulty in keeping up with the rest of the class and most of them have been unable to complete the course.

Salary Scales

To attract the right type of student, a starting salary of R50.00 per month plus C.O.L. is advocated, and an annual increment of R10.00 per month is recommended conditional on successful completion of each phase of the course.

Future Prospects

A survey of the Sugar Industry has revealed that there is a very serious shortage of young men in the industry with the right training to efficiently supervise a process as complicated as that of making sugar. We are trying to alleviate this shortage and amongst those we train today we expect to find some with the enthusiasm and the ability to attain senior positions in the industry in years to come. We are not trying to train bench chemists or pan boilers, but Sugar

Technologists who will have an all round knowledge of sugar manufacturing plant and processes and will also have sufficient basic scientific background to enable them to apply intelligent thought to the problems they encounter.

At the conclusion of the five-year training period, those factories which can absorb the students they have trained into their own organisation will no doubt do so, while those factories which have no suitable openings at the time, should have no hesitation in making available to other members of the industry qualified men they cannot themselves offer suitable employment to.

Numerous problems have been encountered in administering this training programme. One of the most serious was the apathy displayed in certain quarters towards the course and the students. While at the Technical College and under the direct control of lecturers appointed by the S.M.R.I., or in the case of physics, chemistry and mathematics, Technical College staff, the Education Committee could ensure that the required standards were maintained. However, once the student returned to the factory where he worked the Committee had no control over the practical experience he obtained and in certain instances no apparent effort was made by the managements concerned to ensure that the student did receive the proper training.

It has also been said that no factory has yet been embarrassed by a shortage of overseers and there is a danger of training too many at our present rate. If a carpenter can be turned into an overseer overnight this may be so but the Education Committee does not view this practice in a favourable light and there is no doubt that the loss of trained men from the industry during the next twenty years due to retirements alone will absorb all the students we are training at the present rate. Add to this the need to improve the standard of knowledge within the industry and it becomes apparent that our training programme should be much more strongly supported if we are to ensure that the industry is properly staffed in the years ahead.

Much thought has gone into ways and means of eliminating the shortcomings of the present training procedure and it has now been suggested that more effective results would be obtained by centralising the training scheme. Under such an arrangement the students would become the responsibility of one central body and when not undergoing theoretical training, they would be allocated by this body to various factories, not necessarily the same factories each year, and the controlling organisation would ensure that the student was trained along the lines of a predetermined programme.

The burden of operating the course has fallen mainly on the shoulders of Mr. van Hengel, Dr. Graham and the staff of the Department of Pharmacy of the Natal Technical College. Unfortunately the S.M.R.I. are finding it increasingly difficult to make available the services of the senior members of their staff so that it will be necessary in the near future to consider the appointment of a suitably qualified

person to take over the duties of lecturer in Sugar Technology and Factory Control. Under a centralised training scheme this would become a full time post and include supervision of all practical training.

In conclusion your Committee would like to pay tribute to the hard work done by the past chairman of the Education Committee, Dr. van der Pol, who was the chief architect of the present course and only resigned this position when he transferred to Swaziland from where he found it difficult to impart the necessary drive that is essential to keep a training scheme such as this from coming to a halt.

Appendix A

Practical Training Programme

1st Year

Routine laboratory analysis and calculation of all necessary data for the preparation of daily and weekly laboratory returns.

General factory routine during spare time.

2nd Year

Pan boiling including seed preparation, massecuite testing, use of instruments and visits to other factories where different procedures are in use.

3rd Year

First three months on milling plant keeping records of speeds, steam pressures etc. — mutual milling control data — assisting in breakdowns.

Second three months. Boilers, their operation — control — instrumentation, safety precautions — feed water and its analysis.

Last two months, juice weighing and clarification — liming etc.

4th Year

First three months, juice clarification and mud filtration.

Second two months, evaporation.

Last three months, centrifugals — including molasses analysis.

5th Year

Pan boiling revision, massecuite testing and curing. Assisting Chief Chemist with new work or application and testing of new ideas.

Six months with Central Board on cane testing.

Mr. Bentley in introducing the report had said that it was felt that members should know what had been accomplished over the past few years, so that opportunity could be given to discuss and criticise what had been done by the Committee.

Mr. du Toit (The Chairman), said the discussion might give a lead to the South African Sugar Association to adopt the centralised scheme envisaged in the report.

Mr. Grant did not agree that the Industry had displayed resistance and prejudice towards innovations in the past, as over the past 30 to 40 years he had seen much money and time spent by individuals, particularly the late Mr. Patrick Murray, in introducing innovations which proved successful in practice.

He said the course was a very good one as it would not only provide trained factory overseers, but it also opened the door to even higher positions. He asked what the advantage was between the present scheme, whereby students were sponsored by the various milling companies, as compared with the central scheme controlled by the S.M.R.I. At present the factory officials tried to give students an insight into the various departments of the sugar manufacturing process.

Mr. Bentley said that as far as engineering apprentices were concerned there was one individual to supervise the proper training of these young people. It was desired to incorporate the best features of that scheme into the training of sugar students.

In the past difficulty had been experienced in persuading factories to enter students for the course. Generally, factories felt they could not spare employees for the four months necessary, but the Committee was trying to get students who were not required when the factories were working and in the proposed centralised scheme, students would have no obligation to be at factories when they were crushing. They would also be sent, probably, to different factories each year. While at a factory co-operation would be sought from the management for the student to be trained in a particular phase so that there would be no interference with the normal operation of the factory.

Factories would thus also be provided with additional staff, so that additional work which factories would like to undertake, but which at present they did not have the opportunity to do, could be carried out.

Mr. Davies felt that R50.00 per month, as starting salary, did not compare favourably with the inducements offered by other industries and institutions. He said there was a dearth of applicants for process work from the sons of people already employed in the Industry.

Mr. Bentley replied that as far as emoluments were concerned, R50.00 per month was the basic figure to which cost of living allowance had to be added, while housing and other amenities must be taken into account. On the occasions when his Company had advertised, it had been overwhelmed by applications. People already employed in the Industry were welcomed to the course if they were capable of following it, but it had unfortunately been found that many employees had had no scientific training at all and could not follow the course as designed, especially if they were advanced in years. It was therefore felt that the future of the training scheme depended on enlisting youths straight from school and starting them off on a properly designed training course.

Mr. Sargent said that opportunities for advancement were becoming more and more limited. Not only were small factories being closed down but often one found one individual acting as Chief Chemist and Process Manager, or even Factory Manager.

Mr. Bentley stated that an investigation had been carried out and this revealed that there had been extreme difficulty in filling a number of posts in the industry, because the right men were not available. Probable future requirements in the industry were such that some fifteen new students each year would just about meet what the industry required within the next 20 years.

Mr. Girdler considered that under the centralised scheme students would have to be paid by the industry as a whole.

Mr. Bentley said that this was what was envisaged and individual factories would not have to pay a particular student, as had been the case up to now.

Mr. Boyes suggested that a small pilot factory attached to a sugar factory should be established, so that students, instead of listening to lectures, as for example how to conduct factory tests, could carry out these tests for themselves. A small factory, he felt, would not be so very expensive to establish.

Dr. Douwes-Dekker thought that to establish and run a small experimental factory properly would be very expensive and it was better to have students gain their practical training in an existing factory.

Mr. Galbraith supported the view that a pilot factory would be useful, as had been found in other countries. Students could then not only be trained in the finer points of sugar manufacture, but could also do research work which could not be carried out in a present factory without disturbing the process. He felt that sugar machinery manufacturers would contribute most of the plant required.

Mr. Perk said the big advantage of the central scheme was that students would see a lot of factories, meet a lot of people and hear many different opinions, and thus gain better all-round experience than would be provided in a pilot plant.

Mr. Bentley in reply to Mr. Ashe's query, as to how candidates for a course would be selected, said he considered the selection should be made by the controlling committee. If we could reach the standard where we could insist on matriculation with chemistry and physics as major subjects, diplomas could be awarded instead of certificates as at present.

The number required could be flexible and depend on the demands of the industry. The course could be started every third year if there was a slackening in demand, as less than fifteen students would not justify a course, and if the demand increased, the increased number of students required could be accommodated accordingly. There was a big reserve of matriculated youths desiring employment in the sugar industry, as he had mentioned previously.

Mr. Davies reiterated that he had found over the past 30 years that very few parents working in the

industry were willing to put their matriculated sons into the processing-side of the industry. The industry should encourage present employees to do this.

Mr. Bentley said this was a good argument for the course, as in the past the opening was in the laboratory with the possibility of staying there for life. Now we were giving an opportunity to learn as much as possible about sugar production so that people had an opportunity of rising to the top.

Mr. Fourmond thought the course should be arranged so that students went from the laboratory to the various factory departments in the sequence of the manufacturing processes.

Mr. du Toit said this was a matter for the Committee to arrange.

Mr. J. B. Alexander said the Central Refinery felt that its own students were presently at a disadvantage under the present Course, as the Course dealt mostly with raw sugar manufacture and their practical experience was limited to refinery work. He therefore supported the idea of the centralised Course as described.

Mr. Grant thought it a good idea to have one individual in charge of the students and to send them to different factories so they could become familiar with the different processes employed. He therefore supported the centralised Course. He put the point, however, that students at present employed by factories had the advantage of participating straight away in pension funds, whereas with the centralised scheme some years would be lost to them.

Dr. Douwes-Dekker said that Mr. Grant's point would be kept in mind.

Mr. du Toit said the Association was grateful to Dr. van der Pol who initiated both the Factory and Agriculture Courses and to Mr. Bentley and Dr. Cleasby who had carried the work further with such success.

He called for a vote as to whether or not an expression of opinion from the Association should be sent to the South African Sugar Association supporting the centralised scheme. The support of the centralised scheme was carried unanimously by a show of hands.