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WALTER A. SHEWHART AND STATISTICAL QUALITY CONTROL IN INDIA

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Introduction

Statistical Quality Control is the science and art of making the most economic use of material and human resources for the production of goods to satisfy human wants. It comes into use at all stages of industrial work, namely Research, Specification, Production and Inspection. Statistical methods provide an important tool at the research stage firstly in sampling human populations to determine consumer wants, and secondly in designing experimental work for the development of production methods, and in isolating causes of undesired variation at the pilot plant stage. In setting up most economic specifications and tolerance limits, statistical methods play a vital role. A production process can be regarded as completely satisfactory only if the quality characteristics of the sequence of products show none other than random variations. Statistical methods are necessary to find out whether a process is in statistical control and if not to decide when to take corrective action. Finally, any desired quality level of outgoing product can be ensured with a minimum of inspection by the use of appropriate sampling plans.

Statistical Quality Control was initiated and developed in its early years almost single-handed by Dr. Walter A. Shewhart of the Bell Telephone Laboratories, U.S.A. Historically, SQC (Statistical Quality Control) had its origin in inspection work. In 1924, when Shewhart was put on the job, the inspection of manufactured products on a large scale was regarded as purely routine work. The inspection department worked in complete isolation from the production and research departments. The vital contribution which inspection results can make to the manufacturing process as a whole through their reactions on production methods and on specifications was completely overlooked. The position, however, changed rapidly due primarily to the work of Dr. W. A. Shewhart. The personality of the man himself has played a large part in the development of the methods. I have the good fortune of knowing Walter Shewhart as a personal friend, and also of knowing something of his early struggles.

Biographical Sketch

Walter Shewhart was born on the 18th March 1891 in a farm near New Canton, Illinois. His grandfather (original name Schuchardt) came from Germany more than 100 years ago, and settled as a farmer in the mid-West which was then just developing. Walter's father, Anton, was born in a large family which was poor, and he had to begin earning his living after he had finished just four weeks of schooling. He cleared the forest to set up a farm in which Walter was born and which Walter still owns. Walter was great pals with his father and in his childhood days worked with him on the farm. Anton had great innate ability and worked with his hands throughout his life and died in 1935 at the age of 76. Walter's mother, Esta Barney, was descended from English stock which had come over to America in the Mayflower. Anton was forceful and ambitious and an extremely hard worker. Esta, who died in 1932, had great charm and sweetness of character.

Anton had made up his mind that Walter must have a good education. Walter went to school at Barry which was seven miles from the farm, and graduated from the High School in 1909, and got a scholarship in the University of Illinois, Urbana. At that time going to College was unheard of in the Barry area, and Anton was criticized by everybody for sending his son to the University. Walter took his A.B. degree in 1913, majoring in Physics with Mathematics and Chemistry as his other subjects; and A.M. in Physics in 1914. One little story is significant. In 1900 Walter found at Barry a mention of the sine of an angle in a physics book, and nobody there knew what a sine was; and Walter made up his mind to find it, and this is why he took some mathematics. But the book in which sin- occurred was physics, and that explains why he majored in Physics and took his A.M. in the same subject.

Walter met his future wife, Edna, in the High School at Barry in 1906 where they both sat in the front seat. They were married on the 4th August 1914, just before he went to the University of California at Berkeley for his graduate work in Physics. Frederick Slate, an Englishman, was the Head of the Physics Department with whom Walter became very great friends. R. C. Tolman and G. N. Lewis were at that time working in the Department of Chemistry; and Walter attended some of their lectures including one on relativity. Walter wanted to study modern Physics, but there was nobody in Berkeley in 1915 who had interest in quantum or relativity theory. Walter took his Ph.D. with a thesis on "A study of accelerated motion of small drops through viscous medium," and was awarded the Whiting Fellowship of the University of California which would have given him the opportunity of travelling abroad if the war was not on. He got seriously interested in probability through physics, but was unable to take a course as none was being given in Illinois or California.

In the summer of 1916, Walter worked with the Western Electric Co. in New York (an integral part of the Bell Telephone system). He was examined by the medical officers of the firm who all thought he was suffering from tuberculosis. All tests were negative, but he had small fluctuations of temperature which seven medical men accepted as convincing proof of tuberculosis. Walter then started taking temperatures of other people, and found that his own father had similar fluctuations although he had never been ill except only once in his life. Walter discovered that most people have temperature fluctuations; so that his own case could not possibly be considered as abnormal, and he decided not to worry any further about T.B. This clearly was an authentic early piece of work in Quality Control.

After taking his Ph.D. degree, Walter went to Lucrosse Normal School, Lucrosse, Wisconsin, as the Head of the Physics Department for a few months and did some teaching in Physics. It may be recalled, that R. A. Fisher, after taking his degree from Cambridge, was teaching physics in a school in England at about the same time.

In 1918 Shewhart joined the Engineering Department of the Western Electric Co. (which was renamed Bell Telephone Laboratories in 1925) and has been working there since then. In 1918 the first job assigned to him was to develop a sound-proof aviation shield (for which he later took a patent). The question of providing for different sizes of heads came up, and Shewhart recognized that this was essentially a statistical problem. Not a single book of statistics was available in the Bell Telephone Laboratories in those days. His Head of Division had asked Walter to give the specification for sizes next day before going into production. Walter bought the only two books which he could get, one by King and the other by Sechrist, and read these through till four o'clock in the morning. He then took measures of

head sizes of about 100 men working in the Bell Laboratories, and based his specification on these measurements.

It is interesting to note that his very first job set him on the statistical path. Because of his interest in statistics, he was put on the study of physical and chemical properties of granular carbon in 1919. It was at this time that Walter started reading the work of Karl Pearson, and got so interested that he wanted to study statistics seriously. He wrote to Henry L. Rietz (of Des Moine, Iowa, the author of the well-known Hand-book of Statistics and the top man in statistics in America at that time) who advised Walter not to take up statistics as a profession as it was not likely to offer good prospects. Shewhart wanted to work under Karl Pearson but Rietz's advice was against him, and he decided to continue his studies on his own.

The beginnings of SQC

In 1924 Walter was asked, again because of his interest in statistics, to look into sampling problems in the inspection engineering department of the engineering laboratory of Western Electric Co., and to investigate how large a sample should be taken for purposes of inspection. E. C. Molina was in the American Telegraph & Telephone Co. (the parent concern which owned Western Electric Co.), and Thornton C. Fry (author of 'Probability and its Engneering Uses') was in the Western Electric Co. They were both interested in probability and its uses in engineering but not in statistics. In fact, in those days statistics was looked upon as something not scientific, and Walter had a great uphill fight in the early days.

Walter was, however, by this time conversant with statistical methods, and had become convinced of their great possibilities. He thought of the Quality Control chart the very first night he was put on the inspection job; and he wanted to know the pedigree of statistics before drawing inferences. This was how Statistical Quality Control had its beginnings.

From 1924 Shewhart went on developing technical methods. Quite early he had got interested in the logic of science, and he read a great many works on the philosophy of scientific method and of values, nature of evidence, etc. He was trying in fact to lay a sound philosophical foundation for Quality Control methods. After several years of practical applications on an extensive scale in the Bell System, and a deep study of philosophical and logical foundations, he completed his great book on "Economic Control of the Quality of Manufactured Products" which was published in 1931. It is rare indeed to have such an adequate and practically complete presentation of an entirely new technique in a first publication. This book is entirely characteristic of the man in its depth of thinking and thoroughness of handling both abstract and practical problems. Dr. Shewhart gave a more condensed (and in certain ways a more refined) presentation in his Washington lectures in 1939; but the original publication still remains a great classic of recent times.

Shewhart started his work on Statistical Quality Control in 1924. R. A. Fisher at Rothamsted had started his work on the design of experiments just about a couple of years earlier. The two most significant developments in the application of statistical theory in recent times thus had their beginnings in the need of solving urgent practical problems. The basic approach is identical, namely, using variability as a statistical yard-stick to assess stability or to detect change or differentiation. The two methods are of course complementary, and in combination supply a most powerful tool for scientific and technological researches of all kinds.

Shewhart's contribution to the Quality Control movement in America was not confined to the development of the technical methods. He actively helped in its organization. He was Chairman of a committee of the American Society for Testing Materials for the application of statistics in manufacturing industries which was set up in 1929, and of another Joint committee on the same subject set up a little later consisting of representatives of the American Society for Testing Materials, the American Standards Association, the big five national Institutes of Engineering (Civil, Mechanical, Electrical, Chemical, Metallurgical), the American Statistical Association, and the American Mathematical Society. In 1943, a committee was set up by the War Department; and about a year later two committees, one on the application of statistics in industrial problems and the other on Quality Control, were established by the National Research Council with Dr. Shewhart as Chairman.

In 1931 Dr. Shewhart was invited by the British Standards Institute to visit London where he gave a course of lectures in the London University, and took the initiative in organizing a British Committee for Quality Control. He also helped in initiating similar movements in Canada, Australia, and other countries also.

DEVELOPMENTS IN AMERICA

In America, in the meantime, Quality Control was spreading, but on the whole very slowly. The entry of America into the war, however, changed the picture all on a sudden. The huge increase in the purchase of war materials completely upset the inspecting system. A sufficient number of trained inspectors were simply not available to carry out 100% inspection. The War Department was therefore forced to fall back on sampling inspection plans (which in 1924 had served as the starting point of Shewhart's work on quality control). The War Production Board also became aware of the need of using Quality Control at the stage of production.

The first thing necessary was getting ready simple but standard instructions on Quality Control. The A.S.T.M. had used in 1935 a publication on the presentation of data (the word "statistics" was still taboo), but this was not adequate. A National Committee established by the Defence Department took up this matter, and prepared in 1942, three pamphlets which were later issued by the American Standards Association as Z1.1, Z1.2, and Z1.3.

The next essential step clearly was to give enough training to men working in factories to enable them to start quality control in practice. Adopting characteristic American methods, the War Production Board began from 1943 to organize 5-day, 10-day or 16-day intensive courses of training in Quality Control all over the country. A large number of people were sent from the different war production plants to attend these courses. The men were of the most varied type, from trained and experienced engineers and scientists to inspectors and foremen and mechanics. After attending these courses, they went back to their factories and started quality control work with their own hands. Most of them became extremely enthusiastic. Courses of instruction were organized within the factories, and statisticians were invited from outside to give special talks. In this way, the Quality Control movement gathered momentum like a snow ball. The short intensive courses were sponsored by the War Production Board from 1943 to 1946. Since 1946 such courses are being organized by the different Universities and scientific and technological institutions in America.

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Early efforts in India

I had read a note in *Nature* about Shewhart's lectures on Quality Control in London, and was much interested but was unable to obtain in India his book on Quality Control. I succeeded in securing a copy from America in 1933, and obtained some more literature during the next few months. In 1935 I submitted to the Government of India a note on the need of developing Quality Control methods in India.

C.S. & I.R. Committee on Quality Control in India, 1944

The National Committee in America (at the suggestion of, I believe, Dr. Shewhart himself) kept me fully informed of developments and sent me draft and mimeographed copies of Z.1.1 – 1.3. In 1942 I again wrote to the Government of India pointing out the need of using Quality Control methods in war production. I also had some personal discussions. I was offered profuse thanks, and I was assured that I would be sent for when my help was needed. Nothing, however, happened until 1944 when Prof. A. V. Hill, Secretary of the Royal Society of London, came to India on a scientific mission to give advice on the organization of scientific research. At his suggestion, the Council of Scientific and Industrial Research appointed a Committee on Statistics, Standards and Quality Control, of which I was Chairman. This Committee met on three or four occasions and some useful work was done. It was decided to prepare an introductory pamphlet. A special course on Quality Control was organized in the Indian Statistical Institute in 1945-46 and was attended by 12 persons. However, little progress was made on the whole. There were many reasons. We were lacking in industrial experience, and had practically no contacts with industrial concerns. Industrialists, on the other hand, were earning large profits, and were not interested in Quality Control. There were one or two men like C. Tattersall (of the Ordnance Testing Laboratory) who fully realized the importance of using Quality Control, but on the whole, Government Departments were apathetic. I am sorry to say that my own repeated absence abroad from April 1946 prevented me from doing any real work.

This was the position so far as India was concerned, when I met Dr. Shewhart for the first time in May 1946 in New York. During my second tour in America, I was invited by him to give a lecture and have a conference in the Bell Telephone Laboratories in November 1946. By this time, I realized that we badly needed the help of a man like him in India. I was convinced that the best thing to do was to persuade Dr. Shewhart to come to India.

I had a talk with him in this matter while in America, and in December 1946 wrote to the Government of India suggesting that Dr. Shewhart should be invited to visit India. But Government at that time thought that the time was not yet ripe. In March 1947 we took the responsibility to invite him on behalf of the Indian Statistical Institute. Dr. Shewhart agreed to spend a period of three months in India during the winter of 1947-48 and the Bell Telephone Laboratories generously agreed to place his services at our disposal for this period. A little later, invitations were extended to Dr. Shewhart on behalf of the Indian Standards Institution and the Indian Science Congress.

Itinerary in India

Dr. & Mrs. Shewhart arrived in India on the 13th December 1947, and stayed with Sir C. D. Deshmukh (Governor, Reserve Bank and the President of the Indian Statistical Institute) till 16th on which date he went to Delhi to attend the Industries Conference at the

invitation of the Government of India. He returned to Bombay on December 18th; left Bombay and reached Calcutta on December 22nd, where he stayed at Amrapali in Baranagore (where a portion of the Indian Statistical Institute was located), till December 30th when he left for Benares. From Benares Dr. & Mrs. Shewhart went to Patna on the 1st January 1948 to attend the Indian Science Congress; returned to Calcutta on January 6th; and was in Jamshedpur from the 8th to 10th January as the guest of Tata Iron & Steel Co. They left for Hyderabad (Deccan) on January 12th, and stayed there till January 19th and visited Ellora and Ajanta. They were in Mysore and Bangalore from January 19th to 24th and in Travancore from 24th to 27th. The three princely States of Hyderabad, Mysore and Travancore treated them as State guests, and made excellent arrangements for their visit. They were again in Calcutta from the 28th January to 19th February. They then went to Delhi where they stayed with Sir Shriram from the 19th to 26th February, and then to Bombay where they stayed with Sir C. D. Deshmukh from the 25th February to the 4th March on which date they left by air for America.

During the 83 days that he was in India Dr. Shewhart travelled about 10,000 miles by air, 2000 miles by train, and about 500 miles by road not counting shorter journeys within cities. He visited 33 factories and industrial institutions, addressed 35 meetings in different centres, attended 30 round table conferences with Industrialists and Government officers, besides participating in a large number of informal discussions and meetings.

Among the factories and industrial concerns visited by Dr. Shewhart the following may be mentioned: India Electric Works, Hindusthan Bicycle and Industrial Corporation; Titagarh Paper Mills, Baranagar Jute Mills, Government Telegraph Works, Jay Engineering Works, and Bengal Chemical and Pharmaceutical Works in and around Calcutta. Tata Iron and Steel Works at Jamshedpur; Praga Tools Corporation, Hyderabad Chemical and Pharmaceutical Works, Allwyn Metal Works, Vazir Sultan Tobacco Factory, and Taj Glass Works in Hyderabad; Government Electric Factory; Government Porcelain Factory; Government Silk Weaving Factory; Hindustan Aircraft Factory; Mysore Chemicals and Fertilisers Ltd., Sri Krishna Rajendra Cotton Mills in Mysore; Kamani Metal Works; National Radio Company and Khatau Mills in Bombay. These visits gave him a clear picture of industrial conditions in India.

Dr. Shewhart also made innumerable personal contacts firstly with high ranking political leaders and administrators; secondly, with top level industrialists and industrial managers; and, thirdly, with scientists, engineers, statisticians, technicians and industrial workers of all types.

Dr. Shewhart met many of the leading public men in India among whom may be mentioned the names of H.E. C. Rajagopalacharia (then Governor of Bengal and later the Governor-General of India); Jawaharlal Nehru (Prime Minister); H.E. Jairamdas Daulatram (Governor of Bihar); Shyama Prosad Mukherjee (Minister of Industries, Central, and President of the Indian Standards Institution); Sir C. D. Deshmukh (Governor of the Reserve Bank, and President of the Indian Statistical Institute); Sir A. Ramaswami Mudaliar (Dewan of Mysore); Sri P. G. N. Unnithan (Dewan of Travancore); Sri N. V. Joshi (Minister of Industries, Hyderabad); and Sri H. C. Dasappa (Minister of Industries, Mysore).

Among industrialists whom he met may be mentioned the names of Sir M. Visweswarraya (President, All-India Manufacturers' Association); Sir Shri Ram (Delhi Cloth Mills); B. K. Rohatgi (India Electric Works); Sri J. J. Gandhi (Tata Iron and Steel Co.) besides

a very large number of technicians, engineers, managers, research workers and others actually engaged in industrial work. He met many Indian scientists including Sir C. V. Raman, Prof. M. N. Saha, Prof. S. N. Bose, Sir S. S. Bhatnagar, Sir K. S. Krishnan, Sir J. C. Ghosh, Prof. J. N. Mukherjee, Prof. D. S. Kothari. He naturally spent a good deal of time with statisticians in the Indian Statistical Institute and at other centres.

Dr. Shewhart gave lectures at the National Institute of Sciences (Delhi); the Indian Science Congress at the Patna Session; branches of the Indian Institution of Engineers in Calcutta, Delhi, Bombay, Hyderabad, and Trivandrum; the Rotary Club in Calcutta and Jamshedpur; the Universities of Travancore and Delhi; the Indian Institute of Metals (Bombay); Bombay Mill Owners Association; Indian Institute of Chemical Manufacturers (Calcutta); Indian Textile Association (Bombay); the General Council of the Indian Standards Institutions (Delhi); and the Divisional Council on Textiles (Bombay); All-India Manufacturers Association (Bombay). An industrial conference at Delhi convened by the Government of India was addressed by Dr. Shewhart on 17 December 1947. The meetings addressed by Dr. Shewhart, even when primarily intended for industrial workers and technicians, were usually open to all interested people and brought him in contact with a large section of the general public.

Conference on Standardization and Industrial Statistics
Calcutta: 8—14 February 1948

Dr. Shewhart took the lead in organizing a one-week Conference on Standardization and Industrial Statistics in Calcutta from the 8th to 14th February 1947 under the joint auspices of the Indian Statistical Institute and the Indian Standards Institution. About 190 persons (including representatives of industrial management, executives, engineers, and technicians; officers of Government Departments; statisticians and academic workers) attended the Conference from all over India.

The inaugural meeting was held in the Presidency College, Calcutta. Before the proceedings began, P. C. Mahalanobis placed before the meeting the following resolution which was adopted, everyone standing in solemn silence.

"This Conference feels deeply the loss of Mahatma Gandhi who kindled in our age the spiritual light to unite mankind, and, in conformity with his ideals and unceasing devotion to constructive work, pledges itself to the service of the Nation in the various fields of endeavour represented here, namely, Science, Technology, Industry, Administration."

Prof. Mahalanobis introduced Dr. Shewhart with a brief speech about his contributions to science, and the Quality Control Movement. Dr. Shewhart was then unanimously elected President of the Conference on the proposal of the Chairman.

H.E. Sri Rajagopalachari (Governor of West Bengal) who was Chairman of the meeting in his speech described Standardization and Quality Control as the culture and civilization of Industry.

Messages from Dr. S. P. Mookerjee (President of the Indian Standards Institution), Sir C. D. Deshmukh (President of the Indian Statistical Institute), Sir M. Visveswarya, Sir S. S. Bhatnagar, and the Tata Iron & Steel Co. were read at the Conference. Dr. L. C. Verman, Director of the Indian Standards Institution also spoke.

Dr. Shewhart gave his presidential address which was illustrated by a 16 mm. technicolor sound film on Q.C. which had been sent on loan to India by Johns-Mansville & Co. of New York. The Conference was then inaugurated by H.E. Sri C. Rajagopalacharia, the Governor of West Bengal.

On each of the five active days of the Conference, Dr. Shewhart started the proceedings with a lecture—the subjects being Statistical Control methods in general on the first day, and the remaining four on Statistical Quality Control from the viewpoints respectively of Research, Specifications, Production and Inspection. Five lectures were given by P. C. Mahalanobis on Sampling Inspection Plans; two by N. T. Mathew (Indian Statistical Institute) on the Construction of Control Charts; one by A. V. Sukhatme (Tata Iron & Steel Works) on SQC in the steel industry; one by G. D. Mathur (late of Calico Mills, Ahmedabad) on SQC in the textile industry; one by Dr. L. C. Verman (Director, Indian Standards Institute) on the organization and functions of the Indian Standards Institution; one lecture by Dr. U. S. Nair (University of Travancore). Two afternoons were devoted entirely to discussion of questions raised by the delegates. The Conference was an outstanding success and created a deep impression about the possibilities of Statistical Quality Control in India. As a direct result of the Conference, a new Society called the Indian Society for Quality Control was formed, and a Provisional Organizing Committee was appointed with Mr. B. K. Rohatgi (India Electric Co.) as Chairman.

THE INDIAN STANDARDS INSTITUTION

The Indian Standards Institution had been established early in 1947 (only a few months) before the arrival of Dr. Shewhart. In Governmental purchases, somewhat arbitrarily, the British standards were being usually used. This often operated to the disadvantage of Indian products as the British standards naturally failed to take into account the peculiarities of the available raw material and other local factors. The I.S.I. under the leadership of Dr. L. C. Verman, its first Director, is actively engaged in developing appropriate Indian standards. Dr. Shewhart's visit was most opportune, and gave a great impetus to the movement for standardization in India.

On the 15th December 1947, two days after his arrival in India, Dr. Shewhart actively participated in a meeting of the Divisional Committee on Textiles at Bombay. At his suggestion, a Sectional Committee on Quality Control and Industrial Statistics was set up with P. C. Mahalanobis as Chairman, and a number of Statistical and Industrial workers from different parts of India as members. The Committee met in Calcutta on the 4th and 5th February. Dr. Shewhart was present on both days, and gave a definite lead by placing before the Committee a definite programme of work. Among the subjects on which decision was taken may be mentioned, (1) the preparation of standards on Quality Control and on Sampling Inspection Plans; (2) bibliography on Quality Control; (3) articles in different journals on Quality Control; (4) training of personnel; (5) co-ordination between different industries in respect of Standardization and Quality Control.

On the 24th February 1948, Dr. Shewhart attended by invitation a meeting of the General Council of the Indian Standards Institution in Delhi. Dr. Shewhart took the opportunity to express his appreciation of the excellent work that was being done and congratulated the Indian Standards Institution on the progress already made.

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Council of Scientific and Industrial Research Committee on Statistics—Standards and Quality Control

As already mentioned the C.S. & I.R. Committee was established in 1945, and had met 3 or 4 times since then. This Committee was reconstituted early in 1948; and on the 25th February, Dr. Shewhart attended an informal meeting of this Committee in Delhi at which P. C. Mahalanobis (Chairman), and Sir S. S. Bhatnagar (Director, C.S. & I.R.) were present. Dr. Shewhart suggested that this Committee should deal with Statistical Qualify Control from the viewpoint of research, while the Indian Standards Institution Sectional Committee would deal with SQC methods in production and inspection. Dr. Shewhart indicated a number of projects which could be taken up by this Committee or by its subcommittees, for example, the preparation methods in research; work on certain definite problems in textiles, fertilizers, foods and drugs, and metallurgy.

The Indian Statistical Institute

Throughout his stay in India, Dr. Shewhart had his headquarters in the Indian Statistical Institute, Calcutta. In Calcutta, Dr. & Mrs. Shewhart stayed at Baranagore in the house of Prof. and Mrs. Mahalanobis at 87, Barrackpore Trunk Road, where a large portion of the Indian Statistical Institute is also located. This was extremely convenient for the workers and members of the Institute to meet Dr. Shewhart for informal talks and discussions. Dr. Shewhart spent a good deal of time at Statistical Laboratory, Presidency College, Calcutta, where a large number of statistical workers met him from day to day. Dr. Shewhart directed an intensive course of study and discussion to develop a team of workers to help him in the work of the Conference on Industrial Standardization and Quality Control to which reference has been already made.

Dr. Shewhart could find time to look into only a portion of the theoretical and applied work done at the Institute. Most of the latter is unpublished which explains the idea prevalent in some quarters in America that the Indian Statistical Institute is purely a centre for theoretical Statistics.

The Indian Science Congress

Dr. Shewhart was one of the delegates from the U.S.A. invited to attend the 34th session of the Indian Science Congress which was held at Patna from the 1st to 8th January, 1948. At the inaugural session he spoke on behalf of the American Statistical Association, and the American Association for the Advancement of Science. Besides informal discussion with scientific workers from different parts of India, Dr. Shewhart attended some of the meetings of the statistical section and participated in a discussion on Quality Control at a joint session of Engineering and the Statistics Sections of the Congress. He delivered a popular evening lecture on Statistical Quality Control which was illustrated with the technicolor film on Quality Control and which attracted a large audience.

Statistical Quality Control in India

Very little is being done in the way of Statistical Quality Control in India. Pioneer efforts have been in progress at the Tata Iron and Steel Works at Jamshedpur, and the Calico Mills at Ahmedabad, but hitherto with no spectacular results.

Dr. Shewhart was much struck by the wastage arising from uncontrolled heterogeneity in the products of one industry which form the raw material for another industry. The

Hindustan Bicycle Factory of Patna, the Praga Tools Corporation of Hyderabad were experiencing from 15% to 25% rejections due to the round steel rods received by them not conforming to standard specifications. The Jay Engineering Works of Calcutta had 50% rejections on some item due to variations in the thickness of metal sheets. Similar complaints were received from Bangalore, Bombay and other places. The Hindustan Aircraft Factory of Bangalore is not using any Indian steel on aircraft parts, but is obtaining certified steel from outside India for this purpose. One or two cases were reported where the workers threatened to go on strike if certified steel from outside is not provided. Yet if a co-ordinated study is made of the needs in this country for different kinds of steel, and if Statistical Quality Control methods are used at the stage of research and production, it should be possible to cut down much of the wastage mentioned above.

Dr. Shewhart visited a number of textile mills, cotton, silk and jute. The problem of producing shuttles, bobbins, reed etc., of the required quality in India is a research and engineering project requiring cooperative work by engineers, statisticians, and specialists in wood, steel, etc. India is dependent on other countries for most of these articles and when imports run short, production is seriously handicapped. One textile factory, which tried locally produced shuttles, reported that the life of such shuttles varied from 3 months to 9 months; here certainly is a large field for research. A large amount of testing of textile fibres, yarn and threads etc. is going on in mills and research laboratories. In most places in which Dr. Shewhart had an opportunity to examine the methods of testing, he found that existing practices were quite inadequate for the purposes in view. In a single textile factory, in Calcutta, Dr. Shewhart estimated that savings of the order of several lakhs of rupees per year could be effected by proper use of control methods. The state of the drugs and food industries caused serious concern to the visitor used to American Standards in these matters.

DOCUMENTARY FILM ON STATISTICAL QUALITY CONTROL

A documentary sound film on Statistical Quality Control specially loaned to India by the John Mansville Corporation, was shown to industrial audiences in different parts of the country, usually in conjunction with Dr. Shewhart's lectures.