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THE SCIENTIFIC INSTRUMENT INDUSTRY

THE scientific instrument industry has been universally recognised as one of the "key" or the "pivotal" industries, essential for the promotion of research and indispensable for the development, improvement and standardisation of other industries. The spectacular services which the industry rendered during the war have augmented this recognition and raised its prestige. The industry has played a fundamental role in the development of the modern weapons of war, almost human in its operational skill and unerring in the pursuit of its target. Great ingenuity and resourcefulness have been displayed in the instrumentation of industrial machinery and industrial processes. This has led to an all-round rationalisation of industry contributing towards a degree of precision which had not been attained before and securing an enviable measure of economy of time and man-power; these constituted vitally important gains for the war effort.

Instrumentation has accelerated the speed of research; it has been responsible for eliminating physical strain and fatigue in scientific work and for effecting a considerable reduction of the personal and accidental errors incidental to experimental investigations. Improved instruments have facilitated and enlivened the teaching and the demonstration of the principles of science; the industry provides the tools for the training of scientists and technologists needed for the creation, expansion and maintenance of industries. Scientific instruments group themselves into (1) instruments

for purposes of instruction and demonstration in schools and colleges, (2) those needed for pure and applied research, (3) those which are essential for the control of industrial machinery and technological processes, (4) those which are employed in the standardisation of industrial products, and (5) those connected with problems of national defence, and thus encompass every phase of our national life and existence.

For practically every type of instrument India is dependent upon foreign supplies; our national contribution to the science of instruments and instrumentation has been regrettably insignificant. During the war, scientific investigators in this country became painfully conscious of the heavy price the nation had to pay for having, in the past, neglected to develop this key-industry. Just at a time when the Government launched upon a programme of intensive research and industrialisation the scientists found themselves faced with an embarrassing shortage of the essential tools of research, whose supplies have since become increasingly scarce. The scientists themselves, we are afraid, must largely accept the responsibility for this critical situation, since the development of a scientific instrument industry is their exclusive privilege. It is instructive to recall that in the early days of scientific enquiry, scientific men made their own instruments and later, the rise of the instrument industry in Germany and England was closely associated with historic men of science. Far-sighted governments, like that of Germany,

extended their support to the industry and helped to establish intimate collaborations between scientists and manufacturers. One of the most classical of such collaborative enterprises, famous in the history of scientific instruments, is the one which the German Government brought about between Prof. Abbe and the firm of Schott in Jena. In the early days of the last war, the British Government created a Department of Scientific and Industrial Research; the very first task which the Department took up was the problem of rejuvenating the industry of scientific instruments and of the optical and laboratory glasses, through both of which the essential tools of research are forged. The instrument industry in Britain has, in recent years, occupied a privileged position in its national economy; although its direct economic importance is relatively small, its indirect value is recognised to be out of all proportion to its size. The status and prosperity of the scientific instrument industry of a nation, is accepted to constitute a true measure at once of the efficiency and advance of scientific education and research as well as of the economic stability and technological excellence of its manufacturing industries.

The responsibility for the disheartening backwardness of the scientific instrument industry in India should be shared by four groups of agencies; first by the Government who have not encouraged the establishment of this key industry; secondly by the scientists and technologists who have not organised themselves and secured a self-sufficiency for the country with respect to the essential tools and accessories for scientific education and research, thirdly, by the industrial manufacturers who have not yet become sufficiently instrument-minded to lend their support to the industry; and fourthly, by the trading firms who should undertake the responsibility of creating an indigenous manufacturing industry in the country. During the war, a few enterprising firms have tried to establish the nucleus of a manufacturing industry; they have worked under great difficulties and severe handicaps; their heroic and sincere attempts to serve the scientific workers during the war years will be gratefully acknowledged.

The present appears to offer a propitious moment for launching upon a five-year plan for the development of this industry and in accomplishing this task all the four agencies should participate and co-operate; the Government by extending their financial support and offering tariff protection, the scientists by placing their experience at the disposal of the industry and through research, the industrialists by encouraging the instrumentation of their industrial equipment and processes and the trade by organising the manufacture of instruments in their own workshops.

The universities and the research institutes can play an extremely inspiring and constructive role in contributing to the development of the industry; they can inaugurate courses in applied physics with special reference to scien-

tific instruments and industrial instrumentation; they can initiate research on fundamental and applied aspects of scientific instruments. The Council of Scientific and Industrial Research has already financed quite a few schemes which have a direct bearing on the manufacture of scientific instruments. The National Physical Laboratory will, we have no doubt, include a section for the study of scientific instruments. Polytechnic Institutes which are expected to come into being in the next few years, might appropriately offer facilities for training in precision mechanics, instrument design and instrument making; these institutes should be able to provide a continuous flow of competent technical personnel for the instrument industry. The immediate needs of the industry with respect to precision mechanics could, however, be met by a selection from among the "Bevin Boys", and the hundreds of skilled personnel trained in the Ordnance Factories, Munition Workshops and the Hindustan Aircraft Factory. The skilled labour which has been developed during these war years should not be allowed to languish and the scientific instrument industry and the fabrication of chemical plant, if started, could absorb almost the entire quantity of skilled labour now threatened with retrenchment.

With a view to speed up the progress of the industry, it may be advisable to entertain, for short periods, the services of a few top-ranking specialists experienced in this line, who would undertake to train some of our young men during the period of their contract. Large number of such experts from Germany have gone to Britain and America and it is reported that several hundreds of them have been 'removed' by the Russians. A few may still be available in Germany and other parts of the war-devastated Europe; they would eagerly accept an invitation from this country with gratitude and undertake to assist us in developing this industry. The task of choosing these experts may well be entrusted to a Technical Mission which should be deputed to England, America and Germany, who should also be entrusted with the task of studying the industry in all its bearings, and of securing the necessary capital equipment. The Technical Mission should be composed of the instrument-minded and active scientists, creative engineers and shrewd businessmen connected with the instrument trade.

In an editorial on the Scientific Equipment Industry, the *Journal of Scientific and Industrial Research* (1944, 2, 75) entered a strong plea for a pooling of the experience acquired by the scientific workers; it was suggested that the information thus made available should be edited and published and a five-year plan drawn up for making the country self-sufficient with respect to the scientific instruments and laboratory chemicals. We earnestly hope that our leading men of science will take up this task immediately and secure the generous support of the Government for establishing this key industry on a broad and enduring foundation.