Statistics And Quality Control

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CTATISTICS, now-a-days, has been defined as the theory of decision making in the face of uncertainty. The statistical quality control deal. fith various types of acceptance sampling systems and procedures. These are simple but powerful techniques widely used in industries in many countries of the world to improve product quality and reduce costs. The most effective use of these techniques depends upon how these are being understood by the production and manage-In order to ment personnel. execute any formulate and policy, he leading planners and researchers, mill managers, production superintendents, en quality-control and gineers supervisors have to keep kevperformance indicators by plotting atailable figures. These running records are not only on quality measurements of various production processes but also on some other mea-These are production sures. specificainspections, rates, absentism downtime. tions. iniuries late shipments, etc.

Variations, The factor which

to all these

is very common

measurements is the variability. In every production sector quality record is generally main. those responsible for these tained, but it varies every time with new figures which may be even poorer than the ex. pected ones and create a difficult problem of decision-making for the managers. This is the time when the managers whether ! the have to think actual situation is deteriorated or the result is still within. variation; normally expected and whether any perspective action is required or not.

Spcification: production and inspection: Before the production of a mill or industry starts, a decision is necessary as to what is to be made. Next comes the actual manufacturing of the product. Funally, it must be determined whether the product is what was expected. It is wise to think of all the matters relatto quality of products in terms of three key-functions; specification, production

and inspection. Statistical quality control enables the tools help the management in making decisions related to these three functions.

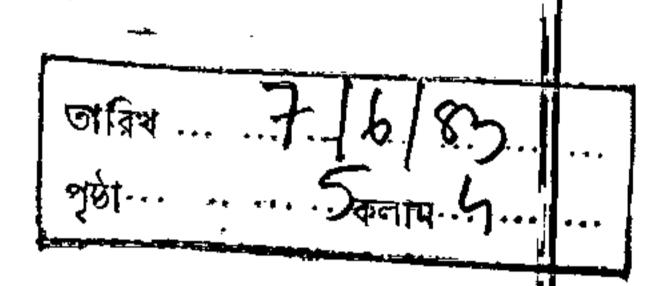
The most effective use of it requires the cooperation among three different functions or decisions at higher levels. If the personnel in these three not understand sectors do each other's problems it would be really difficult to avoid poor quality of products and unreasonably specified tolerance. That is why the techniques of the statistical quality control should be understood at the management level which encompasses all these three functions.

Patterns of variation: It is sometimes, very difficult to the managers of our country to accept the existence of variability. They do not try to understand that without any control measure in the production the resulting qualities or products will still vary. This will be true only when no difference is occurred тeal which is impossible, as -the individual measurement processes introduce differences. Even the repeated measure. ments on the same material are not likely to be exactly the same.

Another important factor in. this regard is the ability to discriminate between random assignable | variability. and This is where the concepts of the most powerful of all statistical quality-control tools— 'the basic control charts'undermust be thoroughly The 'control chart' stood. simply evaluates, whether the data are, or are not in a 'state of statistical control.' If they are; the fluctuations are due to random variability and if they are not, assignable variations are there.

Assignable variations: It is the cause of ausignable variability by elimination of which greater product uniformity, diminishing wastage and reduced costs can be attained If this variation is identified once, it can be traced to specific sources, such as, differences in materials operating techniconditions, sampling ques, working screws, inspection or testing etc.

· Random variations: also important to identify the pertion of variation due to random fluctuations. Generally (Continued **95.4** 30



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whenever we plot a series of numbers from a process (in sequence), that will behave in a fluctuating pattern. Statistical methods will tell us when this pattern is normal and the variation is just due to chance causes. Under this circumstances, the process should be left alone. Frequent unnecessary ed variability and therefore be evoided.

Frightening: The managers who deal with this variability, first have to understand the concept of variability clearly. This is where training in statistical quality-control is help. ful, Generally statistics, to many of our production managers, appears unduly complex. They think that it is a highly mathematical affair and sometimes become frightened of it. But, truly speaking, 'degrees of freedom' 'probability level, 'standard deviation' 'co-efficient of variation,' 'threesigma control limits, 'confidence interval' are not an every-day vocabulary in mills and industries. Although statistical quality-control techniques are based on rigorous mathematics but most of actual applications are little more than simple arithmetic.

This is where the production supervisors or managers of the developed countries have a sig nificant advantage over their in the undercounterparts developing) developed (or countries. Almost all these management personnel have been exposed to the use of statistical methods as a part of their training in the quality-control discipline. Therefore, it is safe to say that the management personnel of the sectors of our production country will understand better and be able to take better decision, if they are made familiar at first with the principles of statistical qualitycontrol techniques which will lead them to obtain maximum output at the minimum level of cost.

How to improve: If management in a mill or industry take any decision without the help of statistical quality-control, they may commit two types of errors. First, suppose, a decision is made to take corrective measure but unfortunately, the variation is just the result of chance causes. Secondly, when a decision is made not to take any corrective measure, the 'deviation from target' is due to assign.

able causes. So, it is very difficult to avoid these two types action will only bring increas- of errors without statistical quality-control measure.

> Statistical methods can also be used for determining the natural capabilities of production processes. This, in turn, permits us to take better decisions on tolerance and specifications and even allows to alternate operating compare systems.

There are other numerous examples of the application of statistical technique which is an aid to decision-making in every management sector. We should have the capability to separate and quantify the sources of variations through analysis of variance (ANOVA). Getting the result from ANO. VA that how much variation is associated with sampling, with testing or with the process itself, is essential for decision making as where to concentrate for sampling and or testing to identify a significant change in quality.

From now, we need more managers who will think statistically. Our industrial training programmes should be developed in such a way, so that the basic concepts of statistical quality-control are there for the management at all levels. We must remember that a process produces not only products, but also data. The analysis of these data and the decisions made out of it will have a great impact on the future success of our mills and Industries.