Quality Control
2nd Lecture Dler Kurda

1. FLOOR INSPECTIONفحص الارضيات

In this system, the inspection is performed at the place of production. It suggests the checking of materials in process at the machine or in the production time by patrolling inspectors. مفتشين دوريات

These inspectors move from machine to machine and from one to the other work centers.

Inspectors have to be highly skilled. This method of inspection minimize the material handling, does not disrupt the line layout of machinery and quickly locate the defect and readily offers field and correction.

پشکنەرەکان دەبێت لێهاتوویی بەرز بن. ئەم شێوازەی پشکنین کەمترین مامەڵەکردن لەگەڵ مادەکاندا دەکات، شێوازی هێڵی ئامێرەکان تێکنادات و بە خێرایی شوێنی عەیبەکە دەدۆزێتەوە و بە ئاسانی مەیدان و ڕاستکردنەوە پێشکەش دەکات.

Advantages

1. Detection of errors of the source reduces scrap and rework.
2. Correction is done before it affects further production, resulting in saving cost of unnecessary work on defective parts.
3. Material handling time is reduced.
4. Job satisfaction to worker as he can't be held responsible for bad work later.
5. Greater number of pieces can be checked than a sample size.
6. Does not delay in production.

Disadvantages

1. Suitable instruments can be employed.
2. Measuring or inspection equipment must be recalibrated often as they are subjected to wear or dust.
3. High cost of inspection because of numerous sets of inspections and skilled inspectors.
4. Supervision of inspectors is difficult due to vibration.
5. Pressure on inspector.
6. Possibility of biased inspection because of worker.

3. COMBINED INSPECTION

Combination of two methods whatever may be the method of inspection, whether floor or central.

The main objective is to locate and prevent fault which may not repeat itself in subsequent operation to see whether any corrective measure is required and finally to maintain quality economically.

4. FUNCTIONAL INSPECTION

This system only checks for the main function, the product is expected to perform. Thus an electrical motor can be checked for the specified speed and load characteristics. It does not expose the variation of individual parts but can assure combined satisfactory performance of all parts put together.

Both manufacturers and purchasers can do this, if large number of articles
are needed at regular intervals. This is also called assembly inspection.

- **5. FIRST PIECE OR FIRST-OFF INSPECTIONS**
- **First piece of the shift or lot is inspected. This is particularly used where automatic machines are**
- **employed. Any discrepancy from the operator as machine tool can be checked to see that the**
- **product is within in control limits. Excepting for need for precautions for tool we are check and**
- **disturbance in machine set up, this yields good result if the operator is careful.**
- یەکەم پارچەی شۆفت یان لۆتەکە پشکنین بۆ دەکرێت. ئەمە بە تایبەتی لەو شوێنانە بەکاردەهێنرێت کە ئامێری ئۆتۆماتیکی بەکاردەهێنرێت. هەر ناتەباییەک لەلایەن بەڕێوەبەرەوە وەک ئامێری مەکینە دەتوانرێت بپشکنرێت بۆ ئەوەی بزانرێت کە بەرهەمەکە لە سنووری کۆنترۆڵدایە. جگە لە پێویستی بە ڕێوشوێنی خۆپارێزی بۆ ئامێرەکە ئێمە پشکنین و تێکچوون لە ڕێکخستنی ئامێر، ئەمە ئەنجامێکی باش دەدات ئەگەر بەڕێوەبەرەکە وریا بێت.
- **6. PILOT PIECE INSPECTION** فحص قطعة التجريبيه
- **This is done immediately after new design or product is developed. Manufacturer of product is done on regular shop floor if production is not disturbed. If production is largely affected, the product is manufactured in a pilot plant. This is suitable for mass production and products involving large number of components such as automobiles aeroplanes etc., and modification are design or manufacturing process is done until satisfactory performance is assured or established.**

7. FINAL INSPECTION

This is also similar to functional inspection. This inspection is done only after completion of work. This is widely employed in process industries where there is not possible such as, electroplating or anodizing products. This is done in conjunction with incoming material inspection.

METHODS OF INSPECTION

1. 100% INSPECTION

This type will involve careful inspection in detail of quality at each strategic point or stage of manufacture where the test is involved is non-destructive and every piece is separately inspected.

It requires a greater number of inspectors and hence it is a costly method. There is no sampling error.

2. SAMPLING INSPECTION

In this method randomly selected samples are inspected. Samples taken from different patches of products are representativesممثلين. If the sample proves defective, the entire concerned is to be rejected or recovered. Sampling inspection is cheaper and quicker. It requires a smaller number of Inspectors.

Drawbacks of Inspection

Following are the disadvantages of inspection:

1. **Inspection adds to the cost of the product but not for its value.**
2. **It is partially subjective, often the inspector must judge whether a products passes or not.**
3. **Weakness and Monotony یەکدەنگیmay affect any inspection judgment.**
4. **Inspection only separates good and bad items. It is no way to prevent the production of bad items.**

QUALITY CONTROL

Quality Control (QC) may be defined as a system that is used to maintain a desired level of quality in a product or service. It is a systematic control of various factors that affect the quality of the product. It depends on materials, tools, machines, type of labor, working conditions etc.

QC is a broad term; it involves inspection at particular stage, but mere inspection does not mean QC. As opposed to inspection, in quality control activity importance is placed on the quality future production. Quality control aims at prevention of defects at the source, relies on effective feedback system and corrective action procedure. Quality control uses inspection as a valuable tool.

Types of Quality Control

QC is not a function of any single department or a person. It is the primary responsibility of any supervisor to turn out work of acceptable quality. Quality control can be divided into three main sub-areas, those are:

1. Off-line quality control, 2. Statistical process control, and 3. Acceptance sampling plans.

1. Off-line quality control: Its procedure deal with measures to select and choose controllable product and process parameters in such a way that the deviation between the product or process output and the standard will be minimized. Much of this task is accomplished through product and process design.

2. Statistical process control:

SPC involves comparing the output of a process or a service with a standard and taking remedial actionsالإجراءات التصحيحية in case of a difference between the two.

It also involves determining whether a process can produce a product that meets desired specification or requirements.

On-line SPC means that information is gathered about the product, process, or service while it is functional. The corrective action is taken in that operational phase.

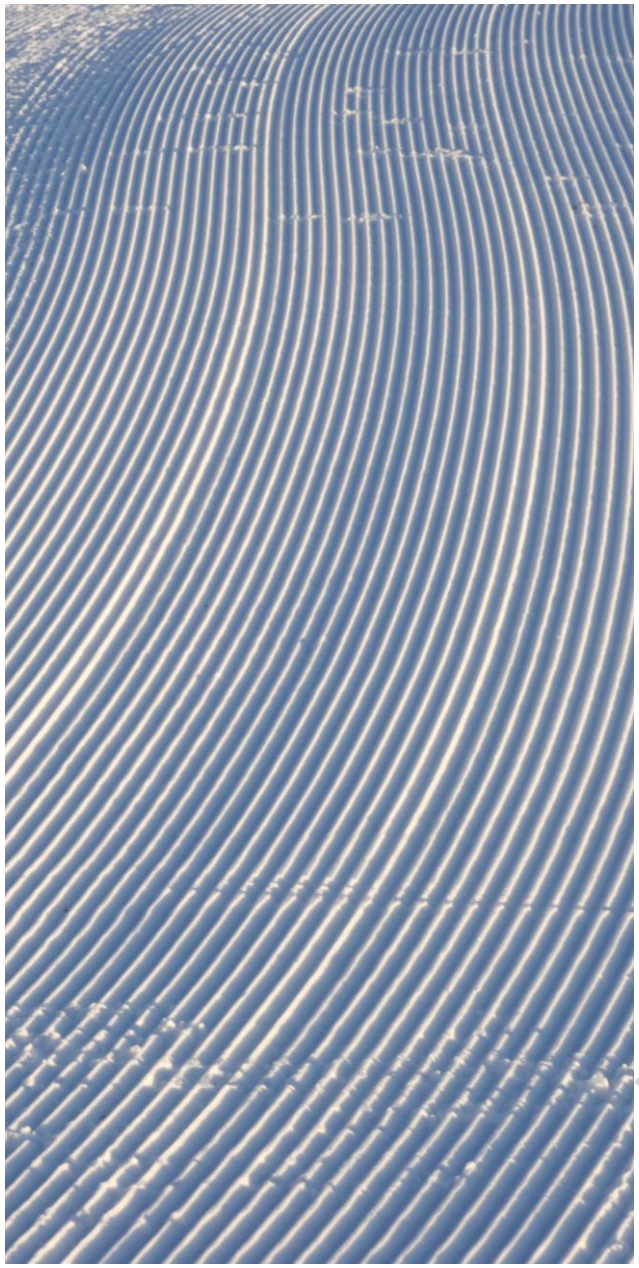
3. Acceptance sampling plans:

A plan that determines the number of items to sample and the acceptance criteria of the lot, based on meeting certain specified conditions (such as the risk of rejecting a good lot or accepting a bad lot) is known as an acceptance sampling plan.

Steps in Quality Control

Following are the steps in quality control process:

1. Formulate quality policy.سياسة الجودة
2. Set the standards or specifications based on customer's preference, cost and profit.
3. Select inspection plan and set up procedure for checking.
4. Detect deviations from set standards of specifications.
5. Take corrective actions or necessary changes to achieve standards.



6. Decide on save method i.e., to decide how the defective parts are disposed of, entire scrap or rework.
7. Coordination of quality problems.
8. Developing quality notice both within and outside the organization.
9. Developing procedures for good vendor-vendee relations.
العلاقات بين البائع والمشتري

Objectives of Quality Control
Following are the objectives of quality control:
1. To improve the company's income by making the production more acceptable to the customers, i.e., by providing long life, greater usefulness, maintainability etc.
2. To reduce companies cost through reduction of losses due to defects.
3. To achieve interchangeability of manufacture in large scale production.
4. To produce optimal quality at reduced price.
5. To ensure satisfaction of customers with productions or services or high-quality level, to build customer goodwill, confidence and reputation of manufacturer.
6. To make inspection rapid to ensure quality control.
7. To check the variation during manufacturing.
The broad areas of application of quality control are incoming material control, process control and product control.

Benefits of Quality Control

- Improving the quality of products and services.
- Increasing the productivity of manufacturing processes, commercial business, corporations.
- Reducing manufacturing and corporate costs.
- Determining and improving the marketability of products and services.
- Reducing consumer prices of products and services.
- Improving and/or assuring on time deliveries and availability.
- Assisting in the management of an enterprise.

Seven Tools for Quality Control

1. Pareto charts
2. Check sheets
3. Cause and effect diagram
4. Scatter diagrams
5. Histogram
6. Graphs or flow charts
7. Control charts

1. PARETO CHARTS

Pareto charts help rank by arranging them in decreasing order of importance. In an environment of limited resources these diagrams help companies to decide on the order in which they should address problems. The Pareto analysis can be used to identify the problem in several forms.

(a) Analysis of losses by material (number or past number).
(b) Analysis of losses by process i.e., classification of defects or lot rejections in terms of the process.
(c) Analysis of losses by product family.
(d) Analysis by supplier across the entire spectrum of purchases.
(e) Analysis by cost of the parts.
(f) Analysis by failure mode.

Example: The Fig. 1: shows a Pareto chart of reasons for poor quality. Poor design will be the major reason, as indicated by 64%. Thus, this is the problem that the manufacturing unit should address first.

A – Poor Design
B – Defective Parts
C – Operator Error
D – Wrong Dimensions
E – Surface Abrasion
F – Machine Calibrations
G – Defective Material