Statistical quality control project

Project Title

Review and evaluation control unit quality Rizan Metal Tos Factory

Mentor

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Spring 1992

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Introduction

At the same time with the growth of the automobile industry in the country and on the other hand, the presence of sanctions by some of the world's largest automobile industry companies, this organization was determined that with proper planning and development of machinery and providing suitable infrastructure and improving construction technology is an effective step towards achieving these goals.

Rizanfeleztoos Factory

Rizanfeleztoos Company started its activity in 1373 with the aim of providing and improving the quality of domestic car parts. At first, this company started its production with differential shell, differential box and arrow wheel bowl, and now the products of this company include Pride differential set, Roa differential set, Plus gear and Dashley Roa gear and Pride gear gear.

The Factory was built on a land with an area of 7000 square meters and its infrastructure has been gradually increased so that currently its infrastructure has an area of 5000 square meters and includes production workshops, laboratories, warehouses and management units. It includes factory management, engineering and production design and planning, research and development, quality control and central warehouse. This company has been one of the first and largest producers in the field of metal car parts in Iran since the beginning of its establishment in order to take over the Iranian market, by transferring relevant technologies from world-renowned automotive companies, and is currently a constructive cooperation. It has the best car manufacturers in Iran, such as Iran Khodro and Saipa.

Quality Policy: As one of the main companies in the production of auto parts, Rizanfeleztoos Production Company always tries to provide the product at the most appropriate time by improving the quality and controlling the costs while gaining the satisfaction of its customers.

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Since 2013, by planning the manufacturing process in the field of producing all kinds of Ser Pelus and Herzgerd gears, he was able to produce and assemble the differential assembly of all kinds of passenger cars. Some of the production capacity of this organization are: 1- Production and assembly of differential gear sets for all types of passenger cars 2-Brass gears of the gearbox of all types of passenger cars 3-Machining all kinds of cast iron parts related to front and rear axle sets of Peugeot and Pride.

The company's quality control unit

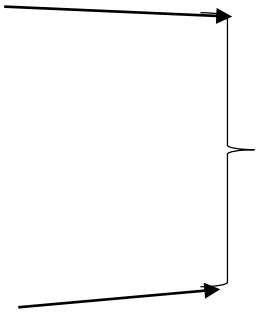
Based on the results of the APQP product creation process, implementation method code PRD000 and what is determined by the customer in the requirements of the PPAP production part approval process, implementation method code PQA019, the organization of control plans that include: product features important product and process specifications, acceptance criteria, measurement techniques, sampling methods, reaction plans for action when the acceptance criteria are not met, for each stage of the production process according to the diagram Determines and executes the OPC operation process.

The organization determines the required abilities and skills according to the PQA001 training implementation method and follows until the qualification conditions are met. If there is a need to perform laboratory tests according to the PQC004 laboratory management implementation method, he issues his request and takes action. All the personnel of the production and quality control unit and other employees whose activities affect the quality of the product are responsible for the care and maintenance of the product in all stages according to the executive method of protecting the product and the customer's property PBU004,007 They are responsible for producing the product.

In cases where the quality control inspector observes during the inspection process that the production operator is negligent in controlling important product and process characteristics, control methods, maintenance of control tools and compliance with instructions. He will be dealt with according to the WQC026 quality warning instructions. All production operators and quality control inspectors are obliged to take necessary actions and information in all stages of part production in accordance with the PBU003 product tracking and identification implementation method to determine the tracking code and complete its records through the product control form in the production process FQC049, including healthy and non-conforming production statistics and ... to complete and sign. They should also be diligent in maintaining it.

Note: Processed parts are allowed to enter the next stage when the records of the previous stage are completed and approved by the quality control inspector. All quality control operators and inspectors at each stage of the process or inspection and test, in case of dealing with non-conforming cargo or parts, act in accordance with the clause of the factory's instructions. When dealing with non-conforming parts, the operator is obliged to inform the control inspector and obtain the necessary instructions. The last point is that in this form, a total of 10 people are working in the quality unit, of which 3 people are working in the quality assurance unit and 7 people are working in the quality control unit.

Qualitative feature investigated



Pride machined shell

The qualitative and quantitative characteristic investigated in this project is the height of the seat of the sweeper bearings, which according to the company's standard should be 98 ± 0.1.

Contracting party companies: Due to the high quality of the products of Rizan Fellez Toos Company, the products of this company have attracted the attention of prominent car manufacturers in Iran, so that all our products are used by them. Among the major customers of the company's products, we can mention important companies such as Megamotor, Saipa, Mohorsazan and Iran Khodro. However, the most important policy of Rizan Felez Tous company is to maintain complete customer satisfaction and provide quality products.

The company's annual production

Rizanfeleztoos factory now includes 3 production halls, laboratory, consumer warehouse and raw material warehouse, tool making and management units including factory management, engineering and design, quality assurance, vice president of production, administration, information and communication technology, finance and... is The production capacity of this company's production lines is now as follows:

Differential pride collection	250,000 yearly
Differential shell Roa	150,000 yearly
Idler and bevel gear pride	1400000 yearly
Irregular and bevel gear	480,000 yearly
Pride gearbox brass gear	1200000 yearly

Inspection and testing of received items

As soon as the raw materials enter the temporary warehouse, the warehouse manager receives the shipment and issues a temporary receipt form and submits a copy of it to the incoming quality control unit along with other accompanying documents, in accordance with the executive order for the protection of the product and the customer's property (FBU004,007), and informs that unit.

The person in charge of raw material control inspection must, within a maximum period of 48 hours, inspect and test the received items in accordance with the received items control program code FQC011 and record and confirm the dimensional, appearance and functional results in the fixed form of sampling information (FQC017) (input control). Quality control manager. If, after the inspection, the shipment complies with the relevant requirements, the person in charge of the control of incoming materials will specify the inspection and test results by means of a stamp on the temporary receipt of the goods (FBU000) and the identification card of incoming raw materials (FBU003), and the cargo will be signed by the person in charge of control inspection. The raw materials are approved by the quality control manager and the cargo is approved for storage. Based on the inspection and test results, the sufficiency of the submitted documents and compliance with the packaging plans of the supplied goods, the person in charge of the control of the incoming materials evaluated the suppliers according to the instructions for evaluating and monitoring the performance of the suppliers under code WBU005 and recorded the results in the computer to the unit. Commerce announces. If the raw material sample items are received from the supplier and the machining and assembly tests are part of the control parameters, it is requested from the production unit through the approval form for machining/assembly test of raw materials (FQC073). The production unit must Within 24 hours after issuing this form, deliver the result to the person in charge of controlling incoming materials. Inspection and testing during production: Inspection and testing during production is considered at the two levels of operator inspection and quality control unit, which has the following characteristics.

Inspection of operators

In order to carry out the best inspection and test during production at the operator level, all the basic requirements of the process, the required facilities and the documentation as described below have been foreseen and provided to him: - Calibrated devices, production equipment and control tools - Product implementation plans for each step of the process according to the OPC and according to the criteria desired by the customer - Production operation process sheet to code (FQA158) including list of equipment, control plans and description of work instructions - Forms for product control during production (FQC049) to record inspection records and test specifications specified in the production process sheet

Quality control unit inspection

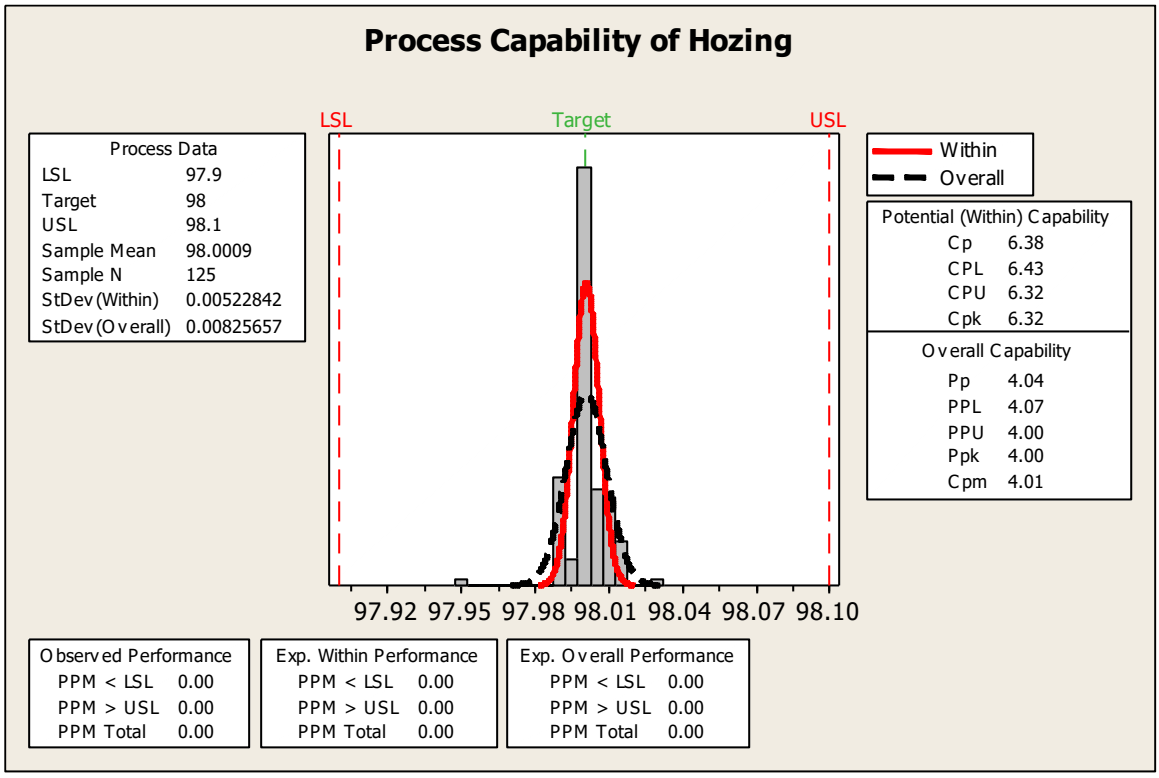
In order to carry out the best inspection and test during production at the level of quality control: - The production process is divided into two parts according to the sensitivity of the work steps in creating the characteristics desired by the customer: The main quality control stations and substations have been separated according to the OPC of the production line. In the main and sub-stations of Bazar, quality control controls and approves each of the lines according to the product control forms in the production process (FQC049). Final product inspection and testing: All the parameters required for the inspection and testing of the final products are determined in the product control plan and the quality control inspector inspects accordingly and records in the sampling information registration form (FQC017) (final control) and for the assembly line. It is recorded in the product control form during production (FQC049). Product audit: In order to ensure the product quality level, the ready-to-ship shipments are audited by the quality assurance unit every month according to the product audit guidelines (WQA019) and the results are used to improve the manufacturing processes. How to deal with non-compliant products and processes: In all stages of inspection and testing, when dealing with non-conforming products, the processes related to those non-conforming specifications should be inspected and stopped in case of deviation. For this purpose, the production line stoppage form (FQC016) is issued by the quality control inspector and the production unit is obliged to take the necessary corrective and preventive measures regarding its removal. The continuation of the process depends on the removal of non-compliance and its approval by the quality control unit. is Regarding the non-conforming products, according to the non-conforming product control implementation method (PQC003), the parts are identified, determined and assigned and subjected to physical control.

Quantitative chart

description change	Code change	time change	Example 5	Sample 4	Example 3	Example 2	Example 1	hour	date
without change		*	98.005	98.005	98.010	98,000	98,000	10	/4/292
without change		*	98.005	98,000	98,000	98.005	98.010	10	/4/292
without change		*	98,000	97.995	97.995	98,000	97.995	10	/4/292
without change		*	97.990	97.995	97,990	97,990	97,990	11	/4/292
setting device	E	11	98,000	98,000	98,000	98,000	98,000	11	/4/292
without change	E	11	98,000	98,000	98,000	98,000	98,000	11	/4/292
without change	E	11	97.990	97.990	97.995	98,000	97.990	12	/4/292
replacement Diamond 1	F	12	98,000	98,000	98,000	98,000	98,000	12	/4/292
without change	F	12	98,000	98,000	98,000	98,000	98,000	12	/4/292
without change	F	12	97.990	97.990	97.990	97.990	97.990	13	/4/292
without change	F	12	98,000	98,000	98,000	98,000	98,000	13	/4/292
without change	F	12	98.010	98.005	98.005	98,000	98.005	9	11/292/
without change	F	12	98.005	98.010	98.010	98.005	98.010	9	11/292/
without change	F	12	98,000	98,000	98,000	98,000	98,000	10	11/292/
without change	F	12	97.990	97,990	97.990	97.990	97.990	10	11/292/
replacement Diamond 2	F	10	98,000	98,000	98,000	98,000	98,000	10	11/292/
without change	F	10	98,000	98,000	98,000	98,000	98,000	11	11/292/
replacement Diamond 3	F	11	98,000	98,000	98.010	98,000	98.005	11	11/292/
without change	F	11	98.030	98.015	98.010	98.010	98,000	11	11/292/

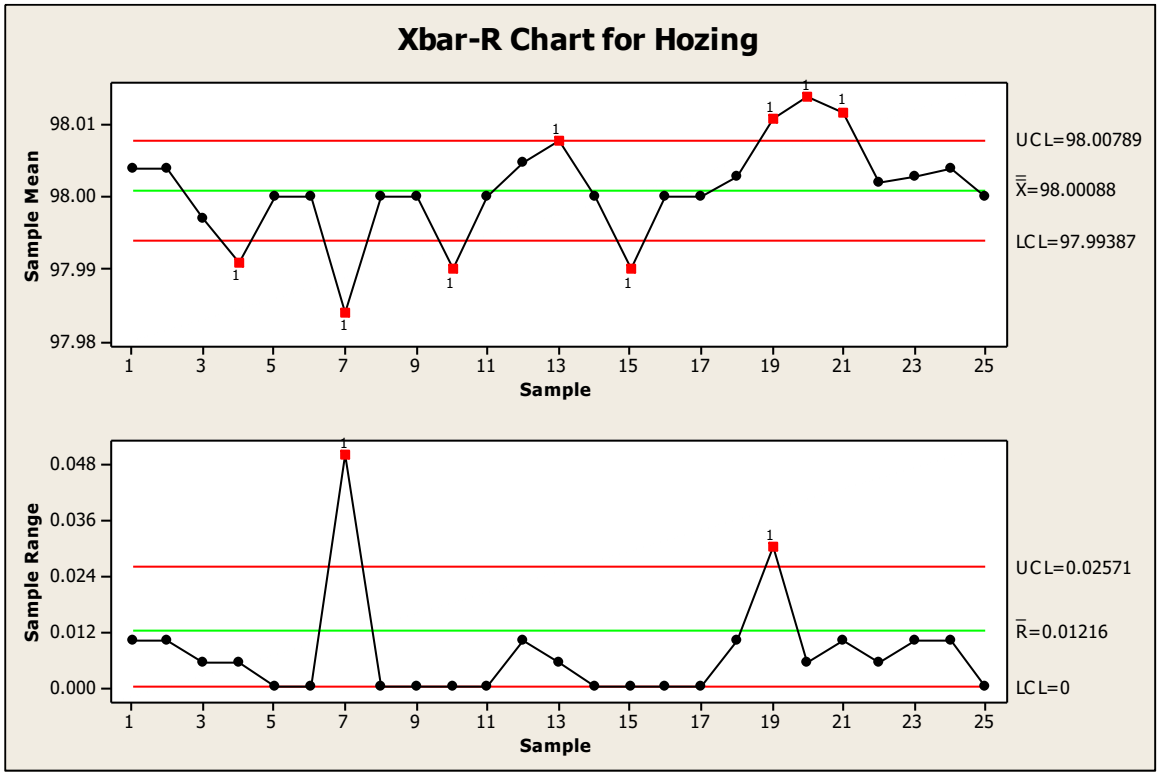
without change	F	11	98.010	98.015	98.015	98.015	98.015	12	**11/2 92/**
without change	F	11	98.015	98.015	98.015	98.005	98.010	12	**11/2 92/**
without change	F	11	98,000	98,000	98.005	98.005	98,000	12	**11/2 92/**
without change	F	11	98.005	98.010	98,000	98,000	98,000	13	**11/2 92/**
without change	F	11	98,000	98,000	98,000	98.010	98.010	13	**11/2 92/**
without change	F	11	98,000	98,000	98,000	98,000	98,000	13	**11/2 92/**

Process capability diagram



As can be seen, since in this process cp is greater than one, the process is able to meet the limits of technical specifications. The average is close to the target, so the process is good in terms of centrality. The black diagram shows the capability of the process in the long term, where S is used instead of σ.

Xbar and R Charts



As you can see, in the R chart, the two points 7 and 19 are outside the control range and should be removed from the chart and redraw the chart. In addition, there are 4 consecutive points in the LCL line in 2 parts of the graph, which is the reason for replacing the diamond.

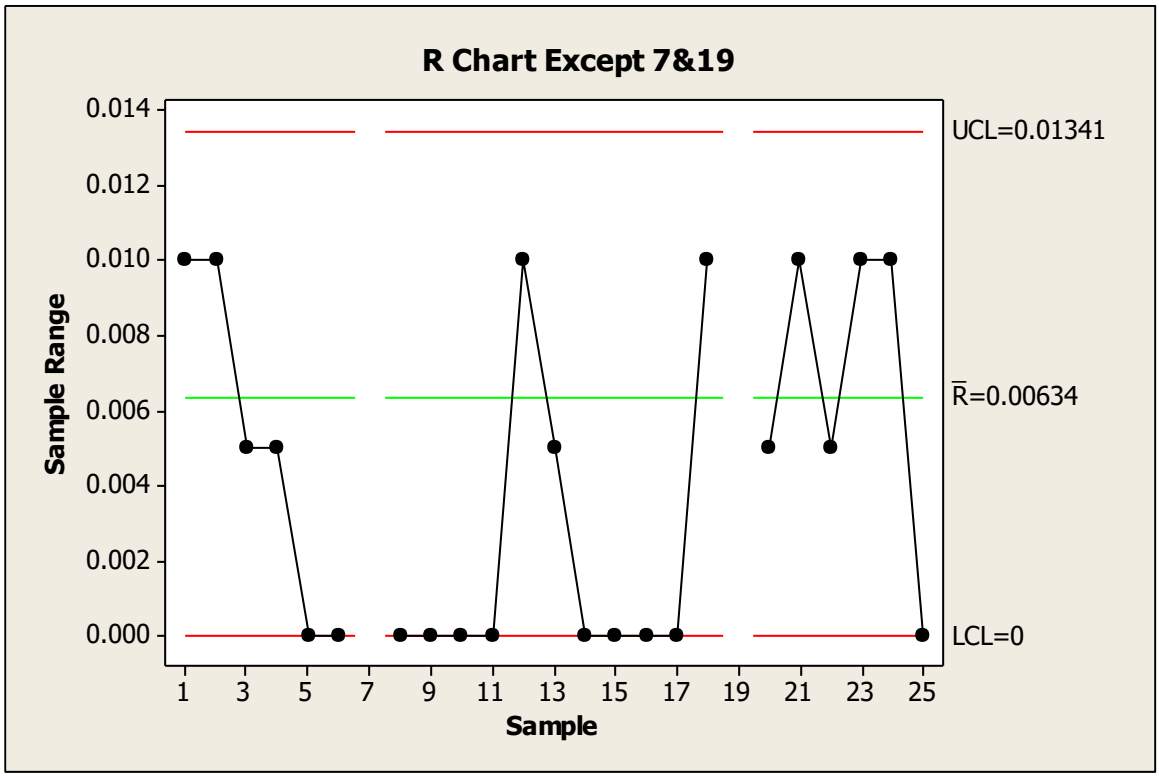
Modification of the diagram

(data after removing points 7 and 19)

description change	Code change	time change	Example 5	Sample 4	Example 3	Example 2	Example 1	hour	date
without change		*	98.005	98.005	98.010	98,000	98,000	10	**/4/2 92**
without change		*	98.005	98,000	98,000	98.005	98.010	10	**/4/2 92**
without change		*	98,000	97.995	97.995	98,000	97.995	10	**/4/2 92**

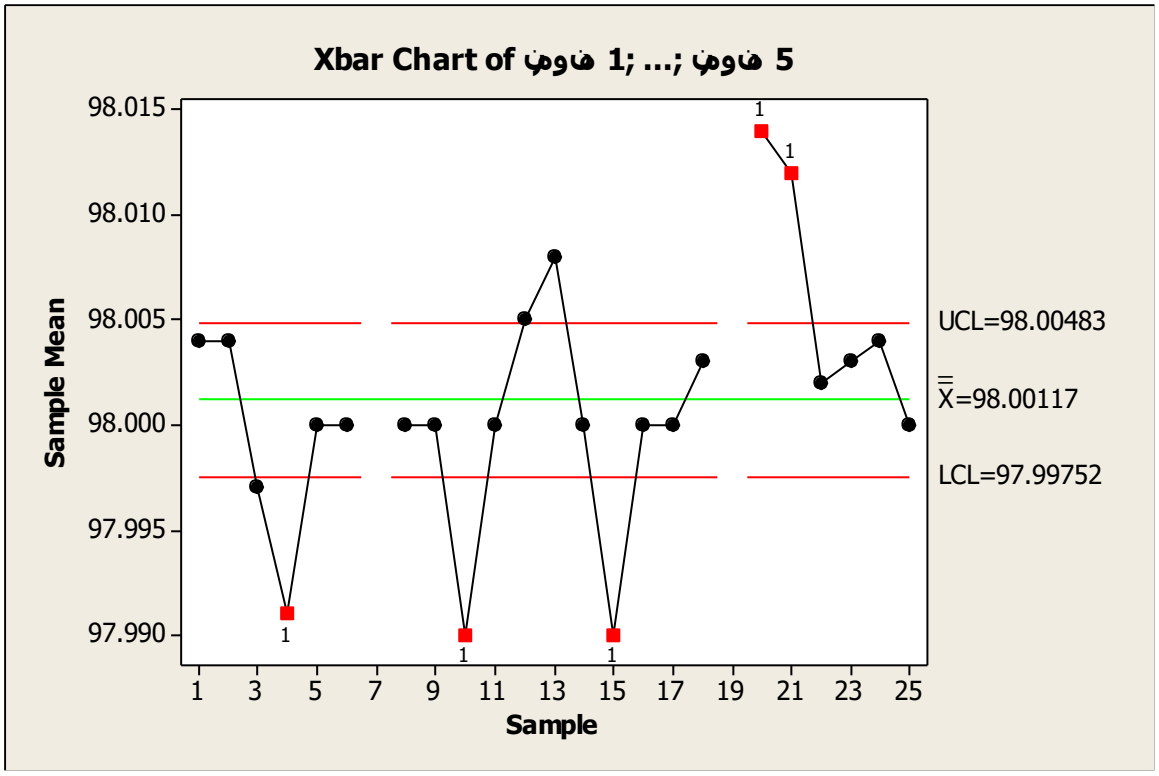
without change		*	97.990	97.995	97.990	97.990	97.990	11	**/4/2 92**
setting device	E	11	98,000	98,000	98,000	98,000	98,000	11	**/4/2 92**
without change	E	11	98,000	98,000	98,000	98,000	98,000	11	**/4/2 92**
without change	E	11	0	0	0	0	0	12	**/4/2 92**
replacement Diamond 1	F	12	98,000	98,000	98,000	98,000	98,000	12	**/4/2 92**
without change	F	12	98,000	98,000	98,000	98,000	98,000	12	**/4/2 92**
without change	F	12	97.990	97.990	97.990	97.990	97.990	13	**/4/2 92**
without change	F	12	98,000	98,000	98,000	98,000	98,000	13	**/4/2 92**
without change	F	12	98.010	98.005	98.005	98,000	98.005	9	**11/2 92/**
without change	F	12	98.005	98.010	98.010	98.005	98.010	9	**11/2 92/**
without change	F	12	98,000	98,000	98,000	98,000	98,000	10	**11/2 92/**
without change	F	12	97.990	97.990	97.990	97.990	97.990	10	**11/2 92/**
replacement Diamond 2	F	10	98,000	98,000	98,000	98,000	98,000	10	**11/2 92/**
without change	F	10	98,000	98,000	98,000	98,000	98,000	11	**11/2 92/**
replacement Diamond 3	F	11	98,000	98,000	98.010	98,000	98.005	11	**11/2 92/**
without change	F	11	0	0	0	0	0	11	**11/2 92/**
without change	F	11	98.010	98.015	98.015	98.015	98.015	12	**11/2 92/**
without change	F	11	98.015	98.015	98.015	98.005	98.010	12	**11/2 92/**
without change	F	11	98,000	98,000	98.005	98.005	98,000	12	**11/2 92/**
without change	F	11	98.005	98.010	98,000	98,000	98,000	13	**11/2 92/**
without change	F	11	98,000	98,000	98,000	98.010	98.010	13	**11/2 92/**
without change	F	11	98,000	98,000	98,000	98,000	98,000	13	**11/2 92/**

Rbar :chart after removing points 7 and 19



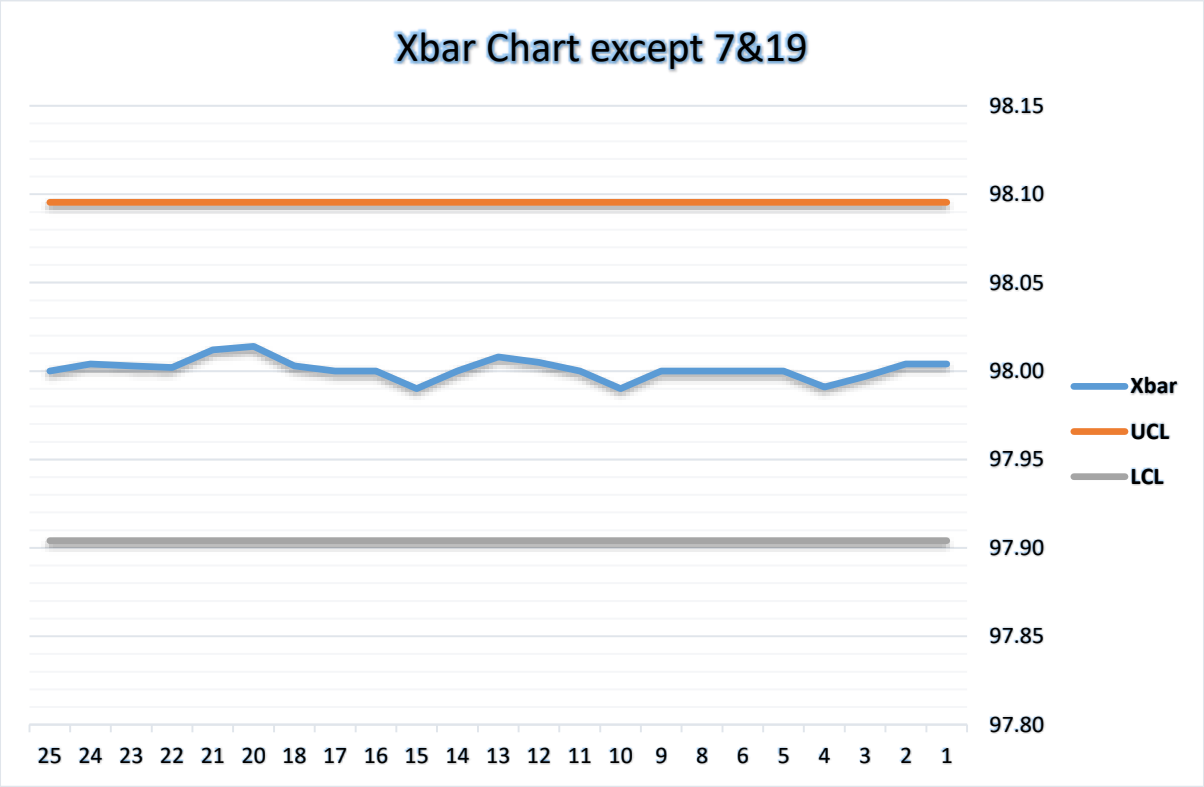
The Bar chart is controlled in terms of dispersion.

xbar :chart after removing point 7 and 19



some points are out of control and should be removed, but since cp is greater than one, the Xbar chart is set as below.

Xbar :chart after adjustment



The data are within the control range, but follow a certain pattern (stratification ¬: most points around the center line), so the graph is not under control in terms of centrality, which can indicate the absence of dispersion. It is normal and may be due to sampling from several different distributions.

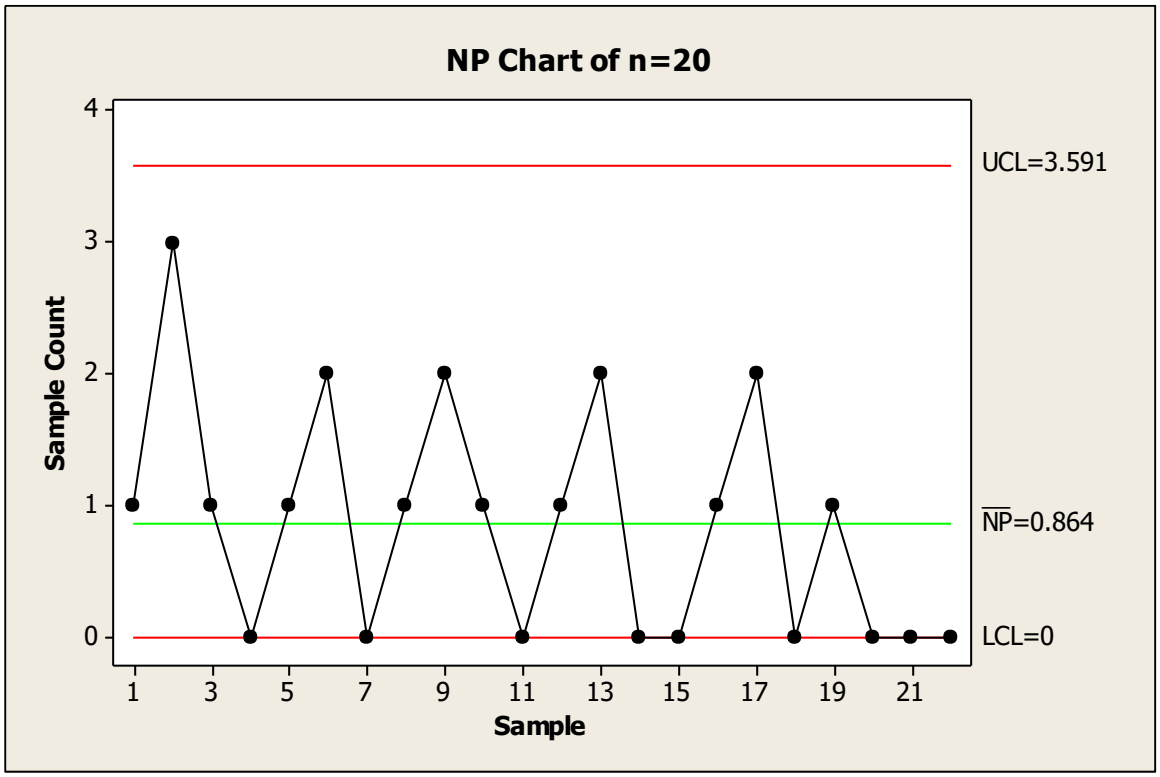
Descriptive qualitative variable

The qualitative and descriptive characteristic investigated is the diameter of the bearing bore, which is checked using a template to see if it is good or not.

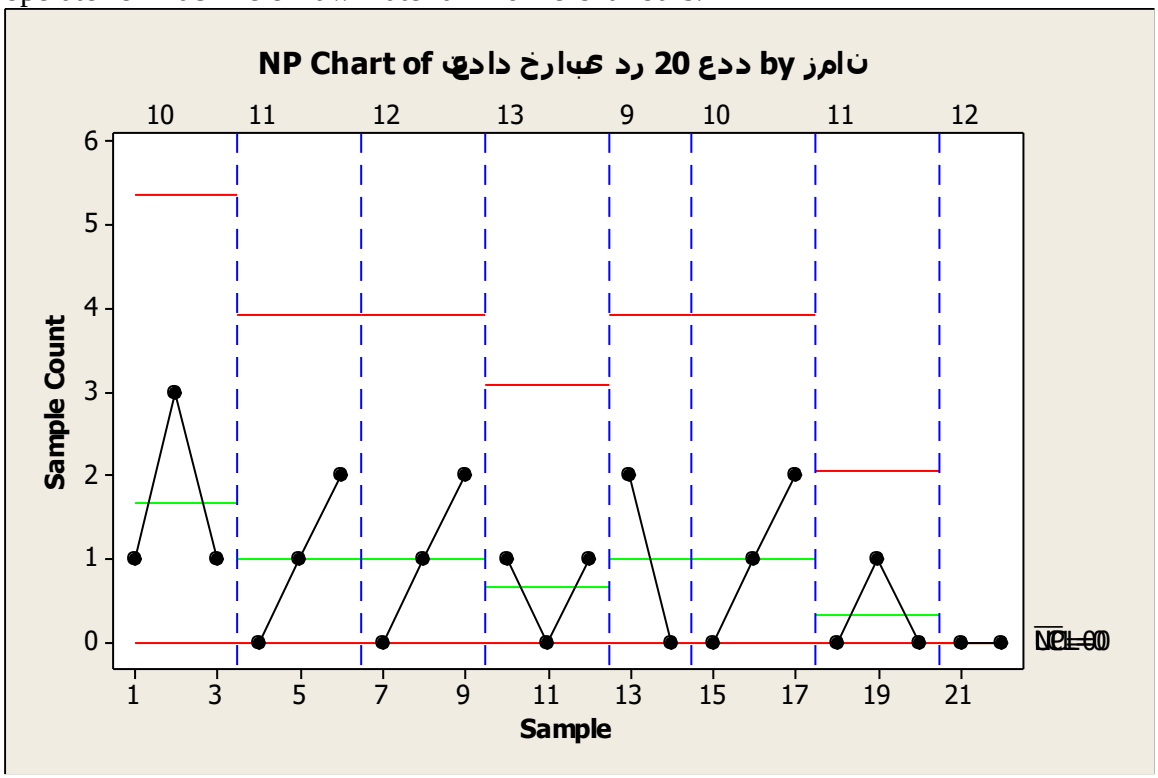
Descriptive chart

time	number failure in 20 pieces	date
10	1	**92/4/2**
10	3	**92/4/2**
10	1	**92/4/2**
11	0	**92/4/2**
11	1	**92/4/2**
11	2	**92/4/2**
12	0	**92/4/2**
12	1	**92/4/2**
12	2	**92/4/2**
13	1	**92/4/2**
13	0	**92/4/2**
13	1	**92/11/2**
9	2	**92/11/2**
9	0	**92/11/2**
10	0	**92/11/2**
10	1	**92/11/2**
10	2	**92/11/2**
11	0	**92/11/2**
11	1	**92/11/2**
11	0	**92/11/2**
12	0	**92/11/2**
12	0	**92/11/2**

NP diagram



At a glance, it can be seen that the graph has a trend and this trend is decreasing, which is due to the replacement of the diamond at the end of the shift and the adjustment of the device by the line inspector. We group the same chart in different hours to analyze the performance of operator or machine or raw material in different hours.



Suggestions for improving quality

1. Using a diamond with a better material so that it slows down later and does not need to be replaced early.
2. Set the device at regular and regular times.
3. Monitor the operator's performance more directly and more strictly.

Summary

At first, we checked the capability of the measurement tool and the quality of the operator (MSA). Then 25 sub-groups of 5 were taken and the graphs of process capability and Xbar and R were drawn for them. For the graph of R, the points outside the limits were removed and the graphs of Xbar and R were drawn again and we see that R is under control, but in the graph Xbar, we have the out-of-control points that we have to remove, but since CP>1, we adjusted the limits and it was observed that the graph follows a certain pattern. Then, to draw the descriptive diagrams of the completed carts, which included 60 parts, we randomly select 20 parts and note the number of defective parts in these 20 parts, and then we check whether it is under control with the NP descriptive diagram.

The End