

Practical Experiments in Statistical Process Control

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Abstract

This project aimed to demonstrate the statistical process control (SPC) used in the industry as a quality tool for production, by means of simple, inexpensive and easily to reproduce experiments. The project taught the use of measuring instruments and demonstrated the application of SPC from simple experiments of measuring with calipers the thickness and length of matchsticks. The students performed the complete cycle: measurement, data tabulation, limits calculation, preparation of control charts and analysis of results.

Key words: *Statistical Process Control, measurement, industrial production*

Introduction

The Statistical Process Control is an important tool used by the industry to improve the production quality. Its general idea is to control the process in a such way that no defective pieces can be delivered from the line. The SPC uses a series of elements, such as control charts, cause and effect diagram, and concepts of statistical distributions. This project focused in teaching High-School students how to prepare a control chart, using inexpensive and easy to reproduce experiments.

Results and Discussion

The students researched about SPC, control charts, calipers, and measurement techniques, aiming to compose a written material about those subjects. They measured the thickness and the length of 480 matchsticks with vernier calipers and recorded the data in electronic sheets (Fig. 1).



Figure 1: Measurement of matchsticks in the Concrete Mathematics Lab.

These measures were used to teach how to calculate averages, standard deviation, and control limits. The students created X-Bar charts (Fig. 2) and evaluated the data distribution by means of histograms. Furthermore, they assessed the quality of the matchsticks production process comparing the charts and the quality standards. The overall conclusion was that the process was far out statistical control.

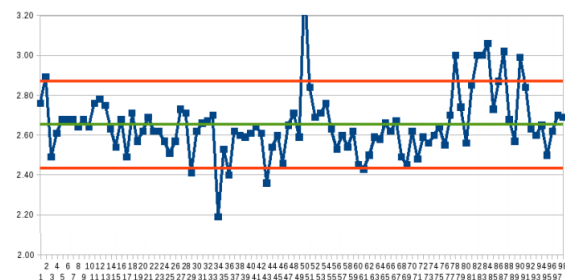


Figure 2: X-Bar chart of the thickness of 480 matchsticks.

Conclusions

The students achieved the objectives of the project and successfully executed the planned tasks. They learned about Linux systems, free software operation, measurement techniques, data collection, control charts, and statistical control process. Furthermore, they prepared reports and a poster for exhibition.

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