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# Monitoring Patents using the Statistical Process Control

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***Abstract*—**The statistical process control (SPC) is one of the most powerful tools developed to assist ineffective control of quality, involves collecting, organizing and interpreting data during production. This article aims to show how the use of CEP industries can control and continuously improve product quality through monitoring of production that can detect deviations of parameters representing the process by reducing the amount of off-specification products and thus the costs of production. This study aimed to conduct a technological forecasting in order to characterize the research being done related to the CEP. The survey was conducted in the databases Spacenet, WIPO and the National Institute of Industrial Property (INPI). Among the largest are the United States depositors and deposits via PCT, the classification section that was presented in greater abundance to F.

***Keywords*—**Statistical Process Control, Industries



## I. Introduction

THE emphasis to seek quality improvements should be focused on continuous improvement, attitudes that promoted continuously, for recognizing the problems, prioritize corrective actions, implement them and give sequence to pro-active, doing the right thing [5]. The use of statistical methods can not guarantee the solution of all problems of a process, but it is a rational, logical and organized to determine where they exist, its extent and how to solve them. These methods can help in getting systems to ensure continuous improvement of quality and productivity at the same time (Chambers and Wheeler, 1992; Carneiro Neto, 2003; Moreira, 2004). The Statistical Process Control (SPC) can be described as a set of tools for online monitoring of quality. With such tools one achieves a detailed description the process behavior, identifying their variability and enabling your control over time through the collection continued data and analysis and blocking of possible special causes, responsible by the instabilities the process under study according to data from our studies [1]. The main idea of the CEP is to improve production processes with less variability providing better levels of quality production output.

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It is very common in factories that industrial processes are not optimized in the sense of being characterized by high levels of efficiency, however, there are tools within the CEP to monitor the process and therefore improve it. (Paladini, 2002; Paladini and Carvalho, 2005).

Thus, the study aims to examine the research being done on the CEP on the basis of national and international patents.

## II. Description Of Technology

The use of CEP helps industries to act in the production process and above all avoid default regardless of where they can express themselves. So is the principle of statistical process control that besides working on the production process without attaching to the product itself makes use of statistics as a basic tool for organizing, processing and analysis of process information. The CEP operates proactively, it employs an objective basis for analysis, comprehensive action is: not limited to some specific cases, but the production as a whole and thus allows for an adequate assessment of product quality.

## III. Scope and Methodology

This technological forecasting was performed on the database of the Spacenet, the National Institute of Industrial Property (INPI) of Brazil and the World Intellectual Property Organization (WIPO), the focus of research was the Statistical Process Control. The key words were used Statistical Process Control that had 927 patents in the database Espacenet and 300 patents in the database and WIPO and Statistical Process Control that had 500 patents in the database Espacenet and 300 patents in the database WIPO, the INPI database key words did not show results as shown in Table I.

TABLE I
Search by Keyword

| Keywords | INPI | Espacenet | WIPO |
|---|---|---|---|
| Statistical Process Control | 0 | 927 | 300 |
| Statistical and Process Control | 0 | 500 | 300 |

Source: Own Author (2012)

## IV. Results and Discussion

Initially the national database the PTO were not found records of deposits to the patent for Statistical Process Control. In Espacenet using the keyword Statistical Process Control found 927 records, with the keyword and Statistical Process Control found 500 records in WIPO using the same keywords were found 300 records for both cases, as shown in Figure 1.

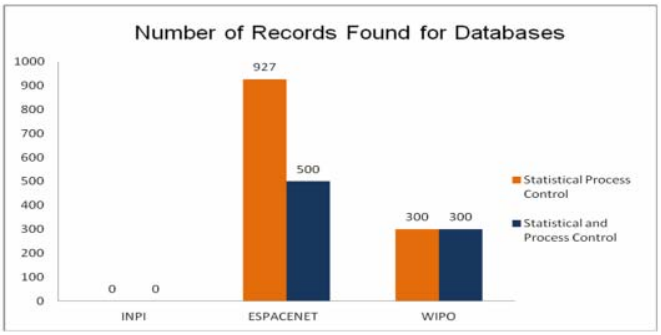


Fig. 1 Number of Records Found for Databases
Source: Own Author (2012)

Based on data found in Espacenet, there was an increase in deposits from the year 1999, highlighting the years 2002, 2003, 2004, 2006, 2007 and 2008. On the other hand it was found that there was a decrease in the year 2010 that showed 16 deposits. The year 2006 was the one that stood out with a number of 51 deposits, anticipated by the year 2003 with 47 tanks and preceded by the year 2007 with 41 deposits as shown in Figure 2.

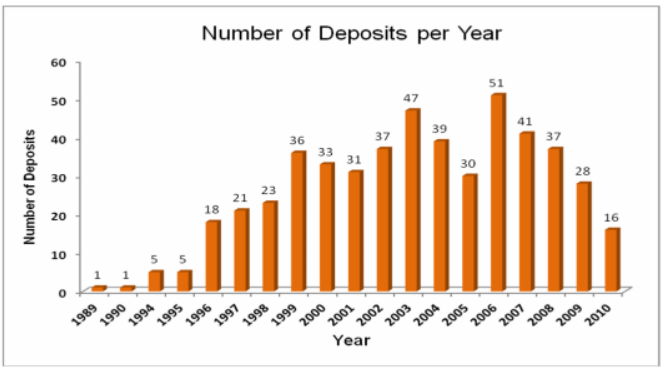


Fig. 2 Number of Deposits per Year
Source: Own Author (2012)

Continuing research in Espacenet found the frequency of deposits by country of origin. According to Figure 3, the United States and China are the largest depositors of patents relating to statistical process control, and the U.S. leads with 226 tanks and China with 78 patents.

After analyze the numbers of deposits by countries it was found which undertakings more deposited request relating to the statistical process control, based on data from Espacenet it was observed that Taiwan Semiconductor MFG [TW], was the biggest depositor of requests for patent for the CEP, as shown in Figure 4.

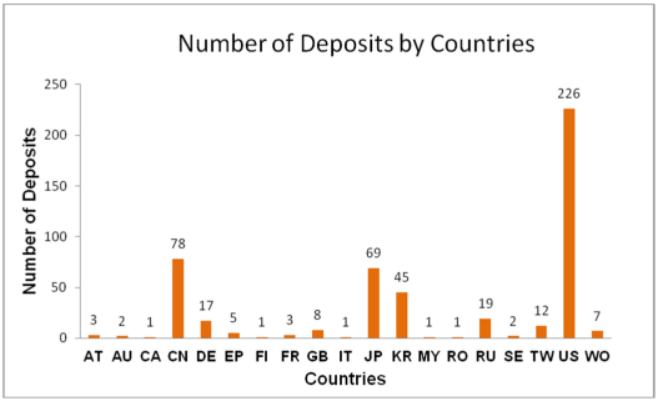


Fig. 3 Number of Deposits by Country Being AT (Austria) AU (Australia), AC (Canada), CN (China), DE (Germany), FI (Finland) FR (France), GB (Great Britain (United Kingdom)), IT (Italy) JP (Japan), KR (Republic of Korea), MY (Malaysia), RO (Romania) RU (Russian Federation), SE (Sweden), TW (Taiwan), U.S. (United States).
Source: Own Author (2012).

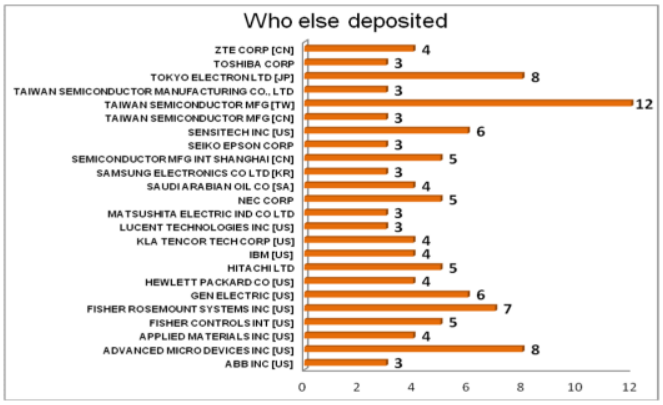


Fig. 4 Companies Request More They put Referring to the CEP.
Source: Own Author (2012)

TABLE II
CLASSIFICATION IPC

| Classification IPC | Quantity |
|---|---|
| A— Human necessities | 11 |
| B — Performing operations; transport | 46 |
| C — Chemistry, metallurgy | 13 |
| D — Textiles, paper | 0 |
| E — Fixed constructions | 4 |
| F — Mechanical engineering; lighting, heating, arms; explosion | 14 |
| G — Physics | 328 |
| H — Electricity | 84 |
| **TOTAL** | 500 |

Source: Own Author (2012).

After analysis of the data classification there was a great use of CEP in physics, together with the area of electricity and processing operations, transportation as shown in Figure 5.

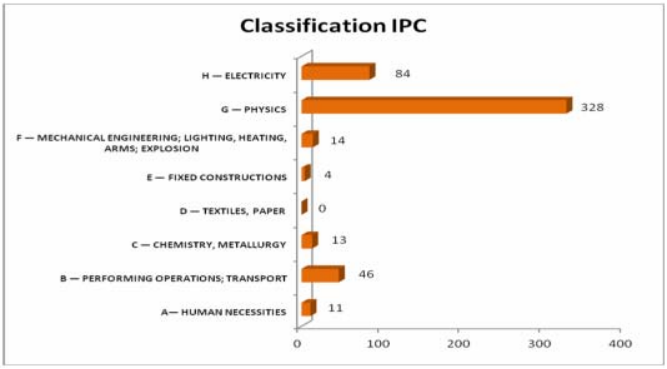


Fig. 5 IPC classification for use of the CEP
Source: Own Author (2012)

In WIPO (World Intellectual Property Organization), following research carried out with the words Cheves Statistical Process Control and Statistical Process Control and there was a greater presence of international applications in 2005, with 30 requests for deposits and there is also a considerable value in 2009 with 29 applications for deposits as shown in Figure 6.

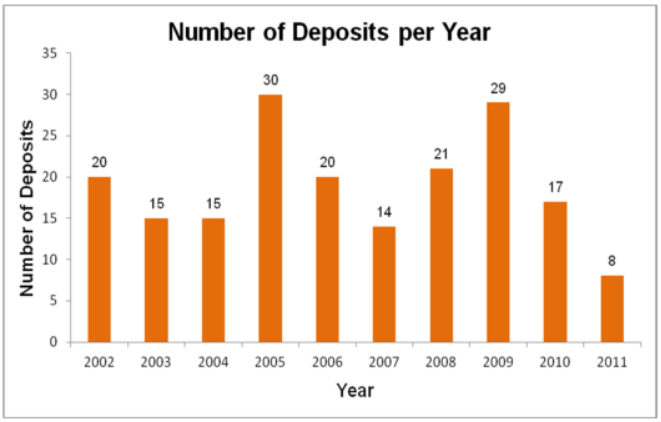


Fig. 6 Number of Deposits per Year in WIPO
Source: Own Author (2012)

Continuing research in WIPO verified the frequency of deposits by country of origin. According to Figure 6, it was found a large number of deposits via PCT (Treaty Patent Cooperation), presenting 105 records deposit request via PCT.

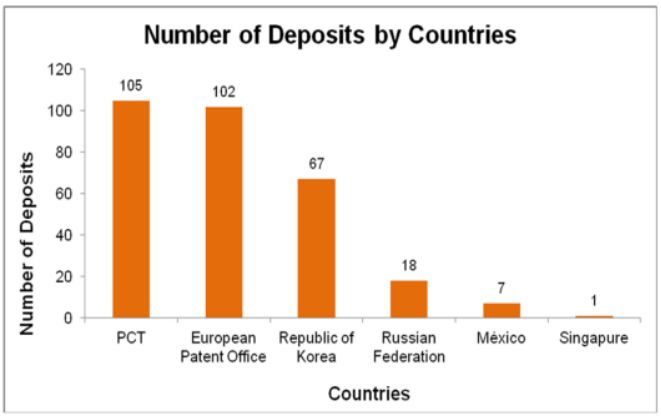


Fig. 6 Number of Deposits by Year Countries
Source: Own Author (2012)

After analyze the numbers of deposits by countries it was found which undertakings more deposited request relating to the statistical process control based on data WIPO it was observed that Fisher-Rosemount Systems, INC. Is the largest depositor of patent applications referent to the CEP, as shown in Figure 7.

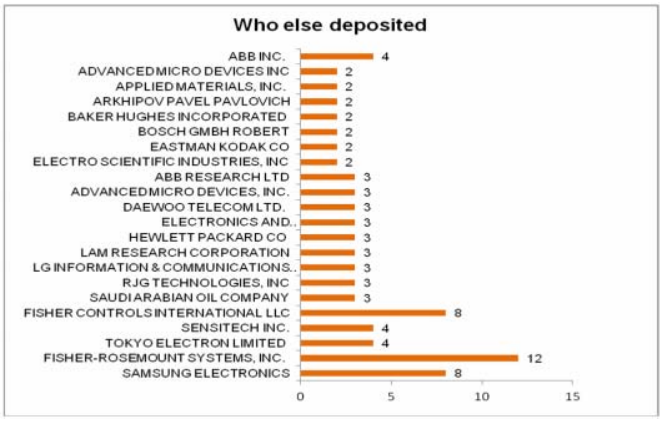


Fig. 7 Companies Request More They put Referring to the CEP
Source: Own Author (2012)

After analysis of the data classification there was a great use of CEP in physics, together with the area of electricity and processing operations, transportation as shown in Figure 8.

TABLE III
CLASSIFICATION IPC

| Classification IPC | Quantity |
|---|---|
| A— Human Necessities | 4 |
| B — Performing Operations; Transport | 34 |
| C — Chemistry, Metallurgy | 5 |
| D — Textiles, Paper | 4 |
| E — Fixed Constructions | 130 |
| F — Mechanical Engineering; Lighting, Heating, Arms; Explosion | 59 |
| **TOTAL** | 236 |

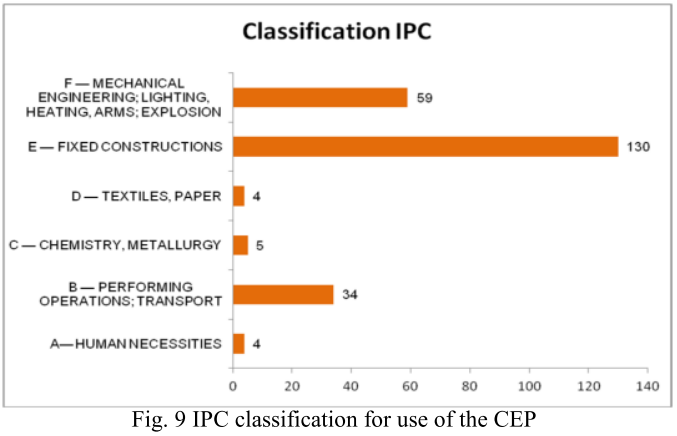


Fig. 9 IPC classification for use of the CEP
Source: Own Author (2011)

## V. Conclusion

The studies conducted in this paper show that the area related to work with the Statistical Process Control is a promising area observing so there was an increase from the year 1996 the number of patent applications mainly in the years 2003 and 2006 Spacenet database, the database of WIPO in 2005 had the largest number of deposits for the CEP. Spacenet in the United States has the highest number of patents per country, but China and Japan also have significant numbers of patents relating to the CEP, at WIPO's largest number of deposits was made via PCT. In IPC classification it was found that both in ESPACENT as at WIPO the area of greatest use of this technology is the area of physics. Thus the CEP technology is being applied to the production process of industries in order to provide better levels of quality production output.

## PERSPECTIVES

As no records were found patent in Brazil would be feasible to compile a patent with the Statistical Process Control for it to be marketed with the national industries of small, medium and large.

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