SYSTEMATIC THE EVALUATION OF MEASUREMENT UNCERTAINTY AND IMPROVEMENT IN TESTS OF FUELS

EXTENDED SUMMARY

Washington Luiz da Silva Martins [1], *Gustavo Daniel Donatelli* [2]

[1] University Federal Santa Catarina (UFSC); Institute Federal of Education, Science and Technology of Santa Catarina (IF-SC), Santa Catarina, Brazil, wluizmartins@ig.com.br
[2] University Federal Santa Catarina (UFSC), Santa Catarina, Brazil, donatelli@labmetro.ufsc.br

Abstract: This paper has the objective to show the panorama of the metrology tests of fuels in Brazil, as well as the development of a systematic the evaluation of measurement uncertainty and improvement in tests of fuel. It is intended, in a next work, to present its application in two real cases of tests.

Key words: metrology, measurement uncertainty, test of fuels.

1. INTRODUCTION

The Brazilian is more and more worried about with the quality of fuel consumed. Thus, there are several research universities, with the aim of evaluating the various tests that are performed in this sector.

Research shows the Brazilian consumption of automotive fuel in the year 2000, amounted to nearly thirty five million cubic meters [1].

The processes of manufacturing and marketing of these fuels are not ideal, so that the consumer receives often fuels whose properties deviate from those specified as unacceptable by national standards.

For that not to occurs, it is necessary that the production and marketing are carried out control actions, process improvement and conformity assessment of products, under an efficient system of quality assurance.

These actions need to be based on reliable data, ie data that describing the characteristic under study with a sufficient accuracy, so that decisions are taken based on them are correct at all practical purposes.

The range of metrology, as one of the variables that affect product quality is proven by the necessity of measurements at various stages of processes, with the objective to verify if the magnitudes of functional products are in accordance with the specifications. " The Metrology plays a supporting role within the system of quality assurance, supporting all evaluations of the quality of products and processes, from design and development phases, until the routine phase of production".

In this context, the objective of metrology is just to establish the conditions for which reliable data can be obtained in a technically and economically efficient.

This work deals the metrological aspects of the tests for conformity assessment of fuel, with a focus on consumer protection, to not be injured.

The protection the consumer has been theme frequent treat in the media, demanding answers from the industries, regulatory bodies and oversight.

In this line of reasoning, should being consolidated in Brazil, a framework of testing of fuels, which should meet the highest international metrological requirements.

Ensuring quality, efficiency prove, demonstrate the accuracy of measurement results are fundamental attitudes levied daily activities testing laboratories [2].

To support these laboratories with regard to the improvement of metrological practices, has created a technical assistance program called CAT-RN-LEC, directed to the laboratories of Universities and Research Institutes, recruited by the ANP to perform testing activities fuel [3].

The objective of this program is to get the results issued by these laboratories are in line with the most demanding international metrological requirements.

Among those requirements, the main thing is that concerning the traceability of test results. Without traceability there can be no assessment of compliance, nor comparison of results issued by different laboratories. For traceability to be meaningful, it is necessary to quantify the uncertainty of measurement with reference to national or international standards, continuously generating data to demonstrate that the measurement process is in statistical control [4].

This task is apparently easier when used in the physical approach. However, a chemical approach (testing fuel) becomes difficult, having to explain complex concepts to be applied to the measurements that are being conducted [5].

So, to certify the quality of fuel, it can be verified by means of measurements, if some variables are cleared according to the specifications of the product conformity.

2. DESCRIPTION OF CONTRIBUTIONS

Thus, the present work has the objective to show the panorama of the metrology tests of fuels in Brazil, as well as the development of a systematic the evaluation of measurement uncertainty and improvement in tests of fuel.

Thus, it was necessary to study the standard for quality assurance in testing laboratories (ISO / IEC 17025), guides (EURACHEM and ISO GUM), quality tools (flowchart, cause and effect diagram, list verification, Pareto diagram, scatter and statistical process control) and (Planning, Implementation, Checking and Action) in the search for continuous improvement.

The systematization proposed consists of a cycle for calculation and management of measurement uncertainty in testing laboratories fuel mounted from the sequence of actions prescribed by the PDCA cycle (Figure 1).
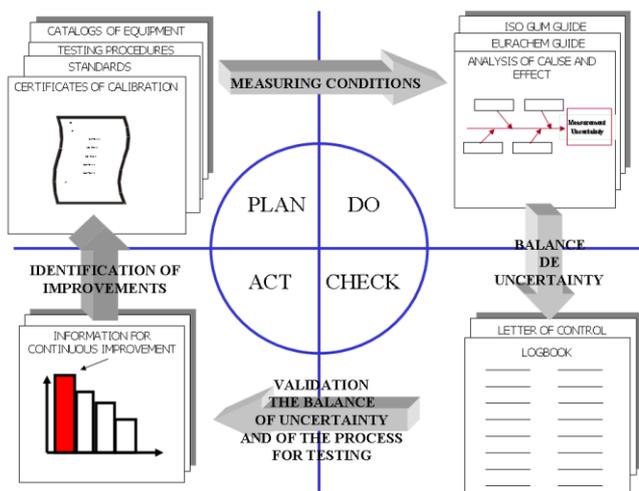

Figure 1. PDCA cycle and quality tools in the management of measurement uncertainty in tests of fuel [6]

3. RESULTS ACHIEVED AND ITS APPLICABILITY

Whereas Figure 1 shows that:

- In the planning stage (Plan), proposes to establish the target value of uncertainty, the collection and systematization of information, which describes a condition in which the test will be done.

- Immediately (in Do), identifies the causes of uncertainty, systematizing the information in a cause-effect diagram and the contributions of each source of uncertainty in Pareto. The uncertainty can then be evaluated, following the recommendations of international enforcement. In this evaluation will be used a mathematical model that expresses the knowledge you have about the measurement

- In step check (Check), to collect empirical data to validate the mathematical model and the hypotheses made about the behavior of the sources of uncertainty. For this, the test procedure should be executed repeatedly, using samples invariable value (eg, oil obtained from a sample prior homogenization). The results, which is charted on a control chart, will remove the special causes of variation, to achieve a predictable process of testing. This stage is assessed if the uncertainty of the method is better than that defined as target uncertainty.

- Finally (the Act) are established objectives for improvement for adjusting the value of uncertainty and / or improve testing.

In this work, is still at the presentation of the main methods of testing and developing a decision matrix for a

future application of systematically developed in two cases of real tests.

4. CONCLUSIONS

Although the tool of PDCA be used in several areas, such as administrative, pharmaceutical and many others, its use, coupled with quality tools, management of chemical tests can be considered a relatively new situation, allowing standardization of information and assisting in the detection process improvements.

And yet, although the focus of work is the testing of fuels, it must be stressed that the systematic use is not restricted only to these but can be applied to a wide range of physico-chemical required by the oil and gas.

ACKNOWLEDGMENTS

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