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Experiences on Metrology, Standardization and Accreditation for the Automotive Industry

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Abstract.

The paper reports on a series of workshops on Metrology, Accreditation and Standardization for the Automotive Industry (MASAI) that has been carried out in México in 2004 and 2005. The workshops analyze those aspects common to the quality triangle (MAS) that are relevant for the automotive industry in its very specific standards and practices (ISO/TS 16949, MSA, PPAP, APQP, etc.), and then focus on the metrology needs derived from them to propose possible solutions and best practices.
In 2004 the workshop addressed the basics of this field and was carried out in 2 main Mexican locations, where automotive industry is most important. In 2005-2006 the workshop will have a focus on the requirements common to the supply chain in this industrial sector and the challenges to achieve intercomparability at low cost.

The workshop has been sponsored by CENAM, NCSLI and CUMMINS, and it is expected that more organizations in more countries participate in the future.

Key words: Automotive industry, ISO/TS 16949, MSA, PPAP, APQP&CP

1. Introduction

Automotive industry is one of the most active and demanding industries in the manufacturing sector, worldwide. In Mexico, Brasil and many other countries with similar manufacturing facilities, its industrial and economical relevance is high. In those countries there are, usually, specific areas in which automotive clusters grow and develop. The enabling technologies and infrastructures are important for the development and competitiveness of these clusters.

Metrology is a very important enabling technology that has some common factors for the different companies in this sector. These factors can be determined and addressed properly starting from a systemic analysis of the sector standardization and requirements framework.

This analysis was made by the authors in a committee meeting of NCSL International in 2004, and the workshop was decided to focus on the metrological requirements o the standards that are mandatory for the automotive industry:

- ISO Technical Specification 16949
- Measurement System Analysis, 3rd Ed.
- Production Part Approval Process, 3rd Ed.
- Advanced Product Quality Plan and Control Plan

2. Objectives

The objective of the whole project has been to enhance the metrological capabilities of the automotive companies that have participated in the workshops, to improve their competitiveness and to promote horizontal and vertical collaboration in the field through the whole supplier chain.

The objective of the paper is to show some of the results of the workshops, its findings, key success factors and lessons learned. An additional objective is to motivate similar projects in other countries and areas, to promote the proactive role of metrology in this important industry.

3. Methodology

The approach of the project has followed the general MESURA Methodology in four stages:
Stage I: Gathering of information of the sector, reference framework, main infrastructures and resources and preliminary detection of needs.

The main objective of this stage is to define the architecture of the project, its objectives, scope and structure.

The first analysis is about the whole industry, its status, trends and main challenges in the region.

Second, the basic quality triangle is analysed and diagnosed:

- Metrology
- Accreditation
- Standardization

Third, the analysis focusses on the most common processes of this industry, mapped in three critical dimensions:

a) Measurement equipment and standards
b) Methods and procedures
c) Human competences

For this specific project about the automotive industry, previous specific MESURA Projects were taken as reference [5] and further cabinet analysis based on indirect sources was performed.

The main session of the workshop attempted to translate some findings of this analysis in a series of recommendations around the Measurement System Analysis handbook.

Stage II: Diagnosis of specific metrological elements and needs in the most critical quantities. On a first approach, the workshop addressed quantities such as:

- Dimensional metrology
- Force and torque
- Hardness
- Vibrations
- Metalography and other material analysis.

In the first edition of the workshop, a diagnosis about each of the mentioned specialities was done by metrologists of CENAM and specific sessions prepared about them.

Stage III: The diagnosis made on stage II is used to produce a series of recommendations for each of the key elements —equipment, methods and human competences—, in each of the critical quantities to be measured, and a program for their enhancement.

In the workshop, general recommendations about each quantity are presented in the form of best recommended practices.

Stage IV: In this stage the actions recommended in stage III are left for each company to be performed. The workshop ended in stage III, since the responsibility for specific actions is of each of the companies.

4. Future work.

The workshop will carry on and the companies are getting very involved. Some of the possible outcomes of the project in the near future could be:

- Identification of specific research and development projects in metrology for the automotive industry.
- Collective development of specific handbooks of recommended practices for specific fields.
- Creation of a non profit organization as a club of Metrology, Accreditation and Standardization for the Automotive Industry.
- Increase interaction of this club with NCSLI and IMEKO.

5. References

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