

MAC Task Group on Determination of Standard Method for Surface Plate Flatness Calibration

Introduction

The 2008 MAC Surface Plate Project Team consisting of K. Haynes, R. Knake, D. Lorenzen, & H. Nielsen was formed to address the following item:

Task group to provide clarification as to how A2LA assessors determine what a standard method is for surface plate flatness and to determine whether there is any current publication available to the public for this standard method.

Statement of Problem

There is no consensus on what constitutes an acceptable method for the calibration of surface plate flatness among the A2LA assessor corps and A2LA accredited organizations. The problem is compounded by the existence of a Federal Specification which has not been updated for over 30 years and that contains simplified measurements that do not measure flatness.

For the purposes of our task group we have defined a “standard method” as follows:

Standard Methods – Test and/or calibration methods, including methods for sampling, that are published and maintained by an international, regional, or national reputable technical organization, or in a relevant peer-reviewed scientific text or journal, that contain sufficient and concise step by step information on how to perform the tests and/or calibrations. The sponsoring organization shall provide a defined procedure that ensures that the method is periodically reviewed and, when necessary, revised to ensure that it remains current, correct, and available to the public and industry.

Currently, a number of methods are utilized by A2LA accredited organizations which are based upon technical papers and/or military standards that have either been abandoned by the controlling organization or were not originally published as a standard method, but rather guidance for surface plate calibration. This creates confusion as to what constitutes an acceptable method for surface plate flatness calibration. In addition it is difficult for an A2LA assessor to determine whether a method provided by a laboratory during the assessment process is considered a standard method. This leads to subjective and inconsistent assessment outcomes.

Plan of Action / Proposed Resolution of Problem

To provide guidance for the A2LA assessor corps and A2LA accredited organizations, to ensure that surface plate flatness is measured consistently amongst A2LA accredited organizations, and to ensure that results are reproducible amongst A2LA accredited organizations, the MAC surface plate flatness task group proposes the following:

As there are currently no acceptable standard methods available, all current A2LA accredited organizations’ methods for calibrating surface plate flatness shall be treated as non-standard methods that require validation in accordance with ISO/IEC 17025:2005, Section 5.4.5. In addition, the organization must provide evidence that the method calibrates flatness in a manner that meets the requirements described in this document. If and when an acceptable standard method for surface plate flatness calibration becomes available, it will be considered acceptable without validation by the A2LA accredited organization.

Organizations whose method for validation includes participation in proficiency testing or interlaboratory comparisons shall also comply with A2LA requirements document *R103 - General Requirements- Proficiency Testing for ISO-IEC 17025 Laboratories*, which requires accredited organizations to participate in acceptable proficiency testing programs. Acceptable proficiency testing programs are defined as:

- Programs that are available through commercial proficiency testing programs (see listing on the A2LA website), and;
- Programs that are available through well-organized inter-laboratory comparisons (ILCs).

If these programs are suitable and relevant to the scope of accreditation, laboratories must participate in these programs.

ILCs should be designed, wherever possible, to follow ASTM E1301 or ISO Guide 43. Acceptability of such programs will be made on a case-by-case basis by the assessor using the *A2LA Guidance for Review of Proficiency Testing Reports*, and will be based on the design of the program, its frequency, the suitability of the samples, and defined written criteria for data analysis and corrective action. For guidance on determining whether the PT summary reports of non-accredited PT providers meet ISO Guide 43, please consult the aforementioned ‘Guidance’ document.

Also, for such a non-standard method for calibration of surface plate flatness to be valid it must ensure that the measurand is the flatness of the surface plate. To measure flatness by determining the straightness of individual lines, the individual lines must be “stitched” together mathematically to make a height map of the plate. A graphical representation of this map does not have to be provided to the A2LA accredited organization’s customer, but sufficient and valid information shall be gathered, recorded and mathematically transformed to achieve a valid flatness result.

Typically the parameters reported for surface plate calibration are flatness and repeat reading. It should be noted that a repeat reading by itself is not a valid flatness measurement, as it only measures the local variation in curvature. However, it is acceptable to calibrate a surface plate for only the repeat reading if that is what has been agreed upon by the customer and it is documented during the contract negotiation process in compliance with ISO/IEC 17025:2005, Section 4.4. The repeat reading shall not be reported in a way that implies that flatness has been measured or a calibration of surface plate flatness has been performed.

Future Plans for MAC Surface Plate Flatness Calibration Task Group

Task Group members K. Haynes, R. Knake, & D. Lorenzen have recently joined the ASME B 89 Committee for the development of a standard method for Surface Plate Calibration. Currently, the committee has a document in draft form and is attempting to arrange a teleconference in the near future to discuss how to proceed with creation of a standard method. It is a long term goal of this Task Group to help develop a standard method for the calibration of surface plate flatness to provide further guidance for the A2LA assessor corps and A2LA accredited organizations through participation in the ASME Committee.

Conclusion

This document was created to ensure consistency among the A2LA assessor corps and A2LA accredited organizations. It is the intention of the Task Group to assist in the development of a standard method for surface plate flatness calibration in the future. In the interim, this document provides an approach for ensuring consistency in how surface plate flatness calibration is assessed.

The Task Group proposes to close our Action Item by publishing the guidance given above as official A2LA guidance until such a time that a standard method for surface plate flatness calibration is published.