ADM 2024 International Conference
September 11th - 13th, 2024 | Palermo (Italy)

Special Session on

Research trends in Dimensional and Geometric Tolerancing

Title

Research trends in dimensional and Geometric Tolerancing

Motivation

ISO GPS and ASME GD&T are two worldwide languages that enable to describe functional requirements through geometrical requirements and also allow an easier and more efficient integrated design process. It is an effective communications language, even when the designer and supplier do not speak the same language. Interactive computational geometrical product specification and tolerancing methodologies can be developed to ensure that form, shape, and size are optimized significantly in order to improve mechanical performance in assembled systems. Even if the standard calls for rigid assemblies, methodologies can be developed to manage effectively deformable parts and assemblies. Recent computational methodology as linear\non-linear numerical finite element analysis, contact analysis, flow interaction, mesh morphing formulation can be used for obtaining an optimal form, shape, and size. Also, assembled flexible components can be controlled in finite element environment according to functional ISO-ASME or ISO GPS tolerances specification; non-linear structural analysis with flow interaction analysis can also give an important contribution.
Even if this topic is one of the long-lasting core topics of the ING-IND15 disciplinary sector, in recent years, research seems like to have decresed in popularity, and therefore in research efforts. The aim of this Special Session is to foster proactive collaboration and showcase the current expertise in the field, boosting research efforts and interest in the Design tools and methods in industrial engineering scientific field.
Topics of contributions include but are not limited to advanced methods for optimizing the performance of assembled rigid and flexible components, industrial case studies, application of standards to complex geometry components also for Additive Manufacturing, introduction of systematic Geometrical Product Specification in companies.

Keywords: Tolerancing, ISO GPS, ASME GD&T, Tolerances specification, Shape optimization, Size optimization, Design for Assembly, Parametric tolerance analysis

Structure

- **Chairs:**

Prof. Gianmaria Concheri [University of Padova Department of Civil, Environmental and Architectural engineering, Design Tools and Methods in Industrial Engineering, Via Venezia 1, 35131 Padova. Italy; gianmaria.concheri@unipd.it]

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Prof. Rita Ambu [Department of Mechanical, Chemical and Materials Engineering, University of Cagliari, Via Marengo 2, Cagliari, 09123, Italy; rita.ambu@unica.it]

- **Presentation Types:** Oral presentations: at least five oral presentations of conference contributions (12-15 minutes presentations).

- **Invited speakers:** talk provided by an expert in the field (20-30 minutes talk). Invited speakers (tentative):

Ing. Lain MacLeod - ISO Technical Committee TC 213, responsible for international standards for Geometrical Tolerancing and Geometrical Product Specification, and BSI technical committee TDW/4/8, responsible for the BS 8888 standard for technical product specification. He is also a Contributing Member of ASME technical committee Y14, subcommittee 5, responsible for the ASME Y14.5 standard.
Dr. Bertrand Nicquevert - He has more than 30 years' technical, coordination and project management experience, in particular the management of interfaces in complex projects. He is an ISO GPS (Geometrical Product Specifications) expert for the ISO Technical Committee TC 213. He had worldwide collaborations for R&D, installation and commissioning of big science instrumentation (mainly at CERN, also at MedAustron Austria and at ESS Scandinavia, and most recently I have joined ALS-U at Lawrence Berkeley National Lab as Technical Coordinator of this upgrade of Advanced Light Source).

Additional Special Session Activities

Presentation of the result from the Geometrical Product Specification Survey developed by the Design Tools and Methods in Industrial Engineering Laboratory from the University of Padova by Dr. Mattia Maltauro. The Design Tools and Methods in Industrial Engineering Laboratory at the University of Padua is proposing a questionnaire internationally to survey the diffusion of geometric specification language in the industrial and educational context. It aims to measure the diffusion of the ISO GPS language in order to capture the state of the art and identify areas of intervention. The initiative is already supported by the University of Padova, ADM, InRiM, Enginsoft, CMM Club Italia, DealtaMu, QFP, Mytutoyo, Iain MacLeod Associate ltd, Hexagon, SA quality for metrology, and Zeiss. The results from the entries collected from Italy will be presented and discussed during the special session. A round table about the topic among the participant will be proposed.