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Dear editors,
We are pleased to submit an original research article entitled "An advanced GCode analyzer to predict build-time in AM components" by Luca Di Angelo, Paolo Di -Stefano and Emanuele Guardiani, for consideration for publication in the *ACTA IMEKO.* That work should be considered as an improved and extended paper of our previous work "*An adaptive build time estimator for Additive Manufacturing",* presented in Naples during the 2019 IEEE International Workshop on Metrology for Industry 4.0 and IoT".

In this manuscript, we show*,* referring also to some previous researches, the reasons which require an accurate estimation of the build-time in AM applications. Then we analyze the state of art in this field identifying two main ways for estimating the build-time: by parametric methods and by detailed-analysis based methods. We demonstrate that the first ones are more flexible than the others but in some case their set-up is critical. These criticalities are still present using detailed-analysis based methods provided by CAE software. So, with the aim of overcoming these limitations, we suggest a new detailed-analysis based method to estimate the build-time required by RepRap machines, that are very widespread in AM applications. The restrictions previously mentioned are passed considering the "look-ahead" strategy implemented by these machineries. Afterwards some test objects are chosen and the estimation provided by our algorithm is compared with the real build time and the evaluation obtained using other professional CAE tools (Cura, MatterControl and Simplify 3D), demonstrating that the proposed method describes perfectly the real cinematic behavior of the machine. In fact the average error is less than 0,1 % respect to the real build time. So we conclude evidencing the positive and negative aspect of the proposed research and we suggest some applications and future developments.

Respect to the paper presented in Naples, the research has been improved and extended. The introduction was entirely rewritten and an accurate analysis of the state of art has been made. A part that describes the reasons and the significance of the "look-ahead" algorithms has been added. Moreover the role of the GCode has been better clarified with a dedicated paragraph in which new images and contents have been inserted. Also the description of the method has been improved thanks to a punctual description of the jerk phase, supported by the images. In the results paragraph new test samples has been analyzed and, moreover, two more CAE programs have been used (Cura and MatterControl) other than Simplify 3D for discussing the results. Finally, the conclusions have been reformulated with new more future scenarios.

This manuscript has not been published and is not under consideration for publication elsewhere. We have no conflicts of interest to disclose.

Thank you for your consideration!

Sincerely,

Emanuele Guardiani
PhD student, Department of Industrial and Information Engineering and Economics,
University of L'Aquila.