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Abstract

Improvement Inspection Method for Rapid Prototyping of an involute spur gears for an Additive Manufacturing process

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Abstract:
Involute spur gears are the most popular power transmission component for various industrial applications such as aerospace, automotive, machinery etc. Involute spur gear tooth is consisted of two blending different type of curves (involute and root). Involute curve called as working portion, contact with mating gear tooth during mesh cycle while root curve called as non-working portion has no effect on meshing process. The form of this curve is directly related with load carrying capacity of gear. Breakage of gear teeth and gear teeth failure due to fatigue is a common phenomenon observed and for many years. The challenges in today's cylindrical gear metrology are an increased need of virtual information on gear geometry; an increasing variety and use of flank modifications; and an improved feedback to the Additive Manufacturing (AM) process. This work aims to improve the process for rapid prototyping of breakage of gear teeth by Additive Manufacturing (AM) by integrate an inspection technique for reverse engineering on involute spur gear using a coordinate measuring machine (CMM) equipped with a "PC-DMIS" measurement and inspection software. Our work consists in developing a procedure for inspection for the shape reconstruction of a circle involute gear from a point cloud with the increase in production final parts by Additive Manufacturing. Aim of this paper is to highlight the inspection method in order to give to designers an high confident design criterion, related to the gear geometry. Selective laser melting (SLM), a relatively advanced additive manufacturing (AM) technique, enables high design flexibility and manufacturing complexity; therefore, it can facilitate improvement in the environmental performance of a complex component throughout its life cycle. In the inspection method that we present, we will compare the design model of the part in view of a form recognition with the mathematical model of construction by ICP (Iterative Closest Point) methods. In order to obtain a reliable result, it is necessary that the CAD model models the part as accurately as possible and that the 3D point cloud that represents the measurement of this part be as specific as possible. The interest of this technique is to show the impact of the dimensional inspection and geometric for rapid prototyping,

3D printing, or Additive Manufacturing (AM) technique.

Biography:
SELLOUM RABIA, is an Phd in Mechanical Engineering from the University of BATNA 2, Algeria. Is a membre of the laboratory of Innovation in Construction, Eco-design, and Seismic Engineering (LICEGS). Her research interests include complex form fabrication process planning, CAD/ CAM, CAI, FEA, rapid prototyping, reverse engineering, 3D printing, topology optimization.

Publication of speakers:

- Selloum Rabia et al ; Corrigendum: High-throughput discovery of novel developmental phenotypes, 2017 Nov 16
- Selloum Rabia et al ; Soft windowing application to improve analysis of high-throughput phenotyping data, 2019 Oct 8
- Selloum Rabia et al ; High-throughput discovery of novel developmental phenotypes, 2016 Sep 22
- Selloum Rabia et al ; The relaxation exercise and social support trial-resst: study protocol for a randomized community based trial, 2011 Aug 25
- Selloum Rabia et al ; Increased H3K9 methylation and impaired expression of Protocadherins are associated with the cognitive dysfunctions of the Kleefstra syndrome, 2018 Mar 15

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