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EDITORIAL

Announcement of the B. John Davies Prize for the best paper published in IJAMT in 2020

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The B. John Davies Prize for the best paper published in IJAMT 2020 has been awarded to Yu YANG, Shimin MAO, Bo BAI, and Yuhua KUANG.

The prize recognizes exceptional articles published in IAMT, and awards authors for making an especially significant contribution. The award was named after the late B. John Davies of the University of Manchester Institute of Science and Technology (UMIST), the founding editor-in-chief of IJAMT who led the journal from its launch in 1985 until 2013.

Process

From all the papers published in 2020, 20 papers were shortlisted with an editor rating above 80 in the first round. The next round selected five finalists, and each paper was carefully scrutinized by the regional editors. The following paper has received the highest vote and is recommended for the 2020 B. John Davies Prize.

Title of the paper

Active design and manufacture of face-milled spiral bevel gear by completing process method with fixed workpiece axis based on free-form machine tool, published in The International Journal of Advanced Manufacturing Technology, volume 112, pages 2925–2942 (2021).

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Abstract

In the design and manufacture of face-milled spiral bevel gear, the completing process method has significant advantages, such as increased efficiency, cost reduction, machining accuracy improvement, and tooth strength enhancement. Since the intrinsic limitations of the cradle type machine tool, we develop a mathematical model for the completing process method directly based on the free-form machine tool. It is applied directly to the free-form machine tool, eliminating the need for the equivalent conversion of machine settings from the cradle-type machine tool to the free-form machine tool, and taking advantage of the flexibility and freedom offered by the free-form machine tool. Thus, except the first-order and second-order parameters of the mean contact point of each pinion flank controlled by the existing methods, each point of the contact path on the frequently used drive-side flank of pinion can be guaranteed additionally simultaneously by this method. Furthermore, the workpiece axis linkage is dispensed with during the machining process, avoiding the error caused by poor motion accuracy of the workpiece shaft and the difficulty in its manufacture. The target tooth surface and tooth depth can be guaranteed simultaneously. Finally, the method is verified by tooth contact analysis (TCA), grinding test, and rolling test.