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Fabrication of micro gear with intact tooth profile by micro wire electrical discharge machining

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Abstract

Micro wire electrical discharge machining (micro-WEDM) provides a promising alternative for micro gear machining. However, the processing defect of non-intact tooth profile often appears due to the influence of micro gear gravity, flushing force and explosive force in micro-WEDM process. This paper presents a process change of micro-WEDM to achieve the precise fabrication of micro gear with intact tooth profile, i.e. firstly reserving a sharp corner on the gear teeth where the processing defect exists and then removing it by the second processing of micro-WEDM. The locating and clamping of the micro gear with sharp corner has been achieved using a novel self-centering flexible fixture. The machining error during the second processing is analyzed, and whilst the process datum is accurately determined. Appropriate processing parameters are obtained by performing preliminary experiments on X153CrMoV12 workpiece, indicating that high open voltage and discharge capacitance cause large kerf width, moderate reference voltage and feed rate

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