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11 **Abstract:** The remanufacturing machining has been recognized as an effective technology that helps improving the energy and materials utilization, and resulting environmental emissions and production 12 costs decrease. Due to the intense lack of sustainability evaluation, therefore, this paper presents a 13 14 novel emergy based evaluation method considering these objects in remanufacturing machining systems. On basis of analyzing the remanufacturing machining and sustainability, this method 15 comprises data collection, emergy based sustainability evaluation model and development of 16 sustainable evaluation indexes and systems. Meanwhile, this method translates the quality loss 17 function, time loss function, and cost into emergy by the Emdollar value, and calculates the emergy 18 19 value of the environmental losses caused by the energy and resources used in remanufacturing machining process and its waste. Finally, the results of the remanufacturing crankshaft machining 20 show that the remanufacturing machining system possesses high production efficiency and return with 21 heavy environmental load state, and the sustainability index is less than 0.05. There is considerable 22 potential for utilizing the energy and alloy powders of the remanufacturing technologies. This study 23 24 contributes to studying sustainability modeling of remanufacturing to evaluate machining process and to optimize remanufacturers and manufacturers. 25

Keywords: Emergy; Sustainability evaluation; Remanufacturing; Machining 26

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