AUGMENT REALITY ENHANCED DEVELOPMENT OF AN INTELLIGENT GRINDING SYSTEM

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Grinding residual stresses are the outcome of complex thermo-mechanical interactions between the grinding wheel and the work piece. The development of residual tensile stress is complicated and influenced by many variables such as grinding process parameter, wheel type and material properties. In grinding, a great deal of heat that enters the work piece is generated as the temperature rises, the hot surface of the work piece being ground wants to expand upward and outward. The upward thermal expansion is unrestricted. However, the surrounding material restricts the outward thermal expansion. When the heated outward expansion is not restricted, the material will be in a state of compression. At a very high temperature, the applied stress will exceed the yield stress of the material and it will permanently deform. Tensile residual stresses can shorten the fatigue life of a component and, if severe enough, can cause it to crack immediately. Their presence accelerates crack nucleation, crack propagation and corrosion reactions thereby reducing the fatigue life of dynamically stressed parts operating in harsh environments. In turbine engine grinding production, accumulation of the residual stress was the major concern since it contributed in deteriorating the overall efficiency of the system. Post grinding surface treatment often employed to introduce fatigue inhibiting compressive residual stresses requires a separate processing facility thereby increasing the cost of production. So, it is necessary to predict its accumulating nature in that grinding process for better accuracy and precision. There were many predictive grinding models methodologies suggested by many existing works which failed to contribute to negligible damage and efficient data collection. The models were not on real -time bases and were unable to capture all the variables influencing residual stress in grinding operation. So, the issue of real time information for grinding correction in a production line has been a daunting challenge. In this work, attempts will be made to increase interaction between the user and the IGS system to extract selected features and process them for the purpose of increasing interaction. Presented technique can be applied to image and AE signals samples using similar technique of processing (based on key-points searching algorithm). Moreover, proposed technique of processing different type of input data like video, image and sound can be used for feature extraction and further classification purposes. In short. this work contribute to solving the problem by designing and developing an AUGMENT REALITY enhanced Intelligent grinding System (IGS) using acoustic emission signals for efficient data acquisition using statistical tools.