Theoretical studies on the mechanisms of laser rust removal YU-PEI WANG, ZUNYUE ZHANG, GUIGENG LIU, FENG SONG, Nankai University — Our studies introduce the three-layer model of laser rust removal by rotational mirror scanner and develop dry laser cleaning model Firstly, theoretically simulate the temperature field of the rotational mirror scanner. Use the superposition model of the instantaneous thermal source point from a point to a line, from a line to an area, to simulate the temperature field distribution of rust and iron with thermal source on its surface and how it varies with time. And then take the temperature field distribution of rotational mirror scanner as the thermal load and use ANSYS to solve the thermal conductivity equations with complicated boundary conditions, and calculate the temperature field distribution it can be found that the temperature of the rust surface reaches the melting even the boiling point of the rust, so the rust can be removed by the ablation effect. From the thermal stress distribution of rust and iron in the depth orientation, the thermal stress existed in the rust and iron is large enough to remove the last rust layer in one time. So ablation layer, thermal stress removal layer and substrate consist of the three-layer model of laser rust removal by rotational mirror scanner.

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