Pattern Engraving for Laser System using Machine Vision

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ABSTRACT

This thesis develops a laser pattern processing system combined a machine vision system and a two-axes linear motor driving system. The control system is base on a personal computer build in a PCI-7344 motion control card, a PCI-6014 I/O card and a PCI-1407 image processing card. At first, processing patterns are captured by the machine vision. We then develop image processing techniques including a median filter, a threshold method and a thinning method, to preprocess this pattern image. Thus, noises are filtered and characters and figures are remained in this processing pattern. The labeling and searching edge techniques are employed to obtain image processing coordinates. These coordinates need to be transfer to X-Y coordinates on the two-axes linear motor table. The computer transmits these X-Y coordinates to the motion control card. It will drive the linear motor table to take a part following loci similar to the processing pattern according to X-Y coordinates. Simultaneously, the computer drives the laser system to discharge the part. Moreover, we program a motion path to complete a smooth point-to-point motion control using a three-sections and cubic PVT polynomial. Therefore, the loci are to be with a smooth velocity and an acceleration. Finally, experiments on a practical laser processing system confirm effect of the proposed method.

Keywords : Image processing ; Laser proceeding ; Motion control ; Machine vision

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