



Project Title: “Welding Machine Monitoring System – Phase II”

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Project Outline:

The major objective of this proposal is to investigate and implement algorithms to further enhance the intelligence of the welding-robot system. Following are the tasks to be done for this project:

(1) Welding Path Identification

This task aims to identify typical welding paths by using image-processing and pattern-recognition techniques. In the previous project, the welding path for a square joint was located. In this project, the welding specimens with different built-up sections will be considered. The system will be able to identify the different types of joint to be welded, and to identify the corresponding welding paths. We will also investigate 3-D measurement techniques, so that the 3-D coordinates of the welding paths can be determined.

(2) Quality Control System during Welding Processes

This task aims to develop a video/image acquisition system for quality control during routine welding processes. The system will capture the videos/images throughout 3 stages, namely i) pre-welding, ii) welding, and iii) post-welding stages. Through advanced image/video processing techniques, the system will be able to record the required technical data, including videos of welding pool formation, temperature profile and history, and width of welds. We will also use 3-D measurement techniques to determine the 3-D structure of the seam surface for each welding pass.

(3) Real-time Multi-Pass Welding Monitoring

This task aims to investigate how to control and instruct the existing welding robot in Welding Workshop W001. The robot is expected to carry out precision multi-pass welding automatically. If appropriate interface software for the welding robot is available, the deliverables of Tasks 1 and 2 will be incorporated. However, more time will be required for this part of work.