Precise Measurement and 3D Modeling for Medical and Industrial Applications: Verification Tests

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SUMMARY

In medical (e.g. craniofacial) and industrial (e.g. inspection) applications, precise data are crucial for 3D reconstruction of objects equivalent to their original specifications. In this study, the main data for both industrial and medical applications are from close range digital photogrammetry and laser scanning techniques. This paper describes the comparison tests to evaluate the capabilities of several measurement system/software on the following aspects: data acquisition (3D point cloud), polygon, wire frame, surface reconstruction (3D solid model) and 3D measurement (linear or curve). The tests are divided into 2 parts, industrial and medical applications. In the medical application, verification of mannequin measurement was carried out using VIVID910 laser scanner system and digital photogrammetric system (DVP). The industrial application comprises of two tests: verification of MMV (Multi Mission Vessel) 3D model (using V-STARS, VIVID910, PHOTOMODELER 5.0, and AXYZ geodetic system), and the determination of surface flatness (using V-STARS, VIVID910 and NIVEL systems). 3D models were compared using RAPIDFORM software (inspection module). The outcome from this research shows the suitability of photogrammetric and laser measurement techniques for industrial and medical applications.