

Contents

Glossary of terms	9
1 Documentation of cultural heritage in terms of legislation	13
1.1 Methods of historical monuments research	15
2 Terrestrial laser scanning systems	17
2.1 Physical principles	18
2.1.1 Radiation source - LASER	18
2.1.2 Principles of distance measurement	21
2.1.3 Principles of laser beam deflection	24
2.2 Methods of LSS measurement	29
2.2.1 The method of spatial forward intersection	29
2.2.2 The spatial polar method	29
2.3 Typological classification of LSS	30
2.3.1 Types of LSS according to distance measurement	31
2.3.2 Types of LSS according to the field of view of scanning	32
2.4 Factors affecting the data collection	33
2.4.1 Internal effects of scanner on the measurement accuracy	33
2.4.2 External effects of scanner on the measurement accuracy	35
2.4.3 The effect of physical properties of the surface on the amount of returned signal	42
3 Data processing	43
3.1 Software for processing of measured data	43
3.2 Manipulation with measured data	45
3.2.1 Combining scans based on overlaps	51
3.2.2 Vectorisation of point cloud	53
3.2.3 Approximation of measured points by geometric entities	55

3.2.4	Viewing and processing of measured data	56
3.2.5	Modelling using a triangulated network	63
4	Photogrammetry	71
4.1	Single image photogrammetry	73
4.1.1	The effect of a depth segmentation	73
4.2	The convergence case of photogrammetry	74
4.3	Stereophotogrammetry	83
4.4	The photogrammetric scanner	83
4.4.1	Theory of image correlation	84
4.4.2	Epipolar geometry	91
5	Conclusion	99
	References	100
	List of figures	103
	List of tables	107