Modern non-destructive approaches for quality control in manufacturing often rely on X-ray computed tomography to measure even difficult-to-reach features. Unfortunately, such measurements require hundreds or thousands of calibrated X-ray projections, which is a time-consuming process and may cause bottlenecks. In the recent state-of-the-art research, tens and hundreds of projections are still required. In this thesis, we examine the radiography physics, technologies, and existing solutions, and we propose a novel approach for non-destructive dimensional measurements from a limited number of projections. Instead of relying on computed tomography, we formulate the measurements as a minimization problem in which we compare our parametric model to reference radiographs. We propose the whole dimensional measurements pipeline, including object parametrizations, material calibrations, simulations, and hierarchical optimizations. We fully implemented the method and evaluated its accuracy and repeatability using real radiographs of real physical objects. We achieved accuracy in the range of tens or hundreds of micrometers, which is almost comparable to industrial computed tomography, but we only used two or three reference radiographs. These results are significant for industrial quality control. Acquiring two or three radiographs only takes a couple of seconds, so we significantly reduce the X-ray machine time and the time required to detect manufacturing errors.