

**Reconstruction and refinement of revolution surfaces
from 3-D data measured by CMM**

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Abstract:In the fields of computer graphics and computer aided design the problem of surface reconstruction starting from a cloud of points is a well-known one and presents different approaches in term of application fields and starting data structure. Most of them are general-purpose methods whereas our work tackles with a special kind of shapes: revolution surfaces. A coordinate measuring machine (CMM) measures the coordinates of the surface points. The proposed method is a mix of two classical mathematical techniques: parametric approximation by quasi-interpolating spline and linear algebraic transformation. In detail it takes into account that a surface of revolution can be described either by rotating a single cross section along the symmetric axis (by meridians) or by translating the cross-orthogonal section along the symmetric axis (by parallels). Moreover, it considers that the measured points are not deterministic due to manufacturing inaccuracy and measurement uncertainty, and it reconstructs the 3-D shape using a method based on parametric integral spline. An experimental example shows that this approach gives more accurate results with respect to B-spline approximation. **Keywords:** surface of revolution, reverse engineering, quasi-interpolating spline, linear algebraic transformation, Coordinate Measuring Machine.