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Analysis and Modeling of Roundness Error in the Design Process of a Measuring Machine

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Abstract: Roundness is a geometric form tolerance required for circular or cylindrical parts used in a great amount of mechanical assemblies. This form tolerance is controlled in order to assure the correct performance and lifetime of an assembly. The design and construction of a roundness machine requires the ability to measure, analyze and validate roundness on parts, to assure the measuring capability. The analysis applied in this paper uses two international methods to determine roundness error: minimum zone circle (MZC) and least square circle (LSC); "The calibration of a Roundness Standard of the National Bureau of Standards from USA was used to elaborate the study. The referred methods use polar coordinates data as primary source. The analysis performed using these methods help to determine the preliminary machine error in measuring roundness.

Keywords: Roundness, Geometric Characteristic, Least Square Circle, Minimum Zone Circle, Polar Coordinate, Error Evaluation, Measuring Standard, Coordinate Data