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Modeling A Machining Process By Piecewise Regression Method

David Gonzalez-Gonzalez¹, Mario Cantú-Sifuentes¹, Rolando Praga-Alejo¹, Pedro Pérez-Villanueva¹, and Miguel Mendoza-Zamora²

¹COMIMSA. Ciencia y Tecnología No. 790, Frac. Saltillo 400
C. P. 25290, Saltillo, Coahuila, México.

²Facultad de Sistemas. Universidad Autónoma de Coahuila
Ciudad Universitaria, Carretera a México Km 13
Arteaga, Coahuila, México.

Corresponding author's E-mail: mdavidgonzalez@comimsa.com

Abstract: In manufacturing processes, the selection of optimum process parameters plays a significant role to ensure the quality of the product. For this purpose, the method based on linear models (as response surface methodology and canonical analysis) is employed. However, in some cases, the polynomial used for modeling the process does not fit adequately, hence, the inference about the process and the optimization realized are not sufficiently accurate. Considering this fact, it is necessary to fit alternative models which better represent the process modeled; a good option could be non-linear models. In this paper, we propose to use the piecewise regression method for modeling a machining process which could not be modeled by a common full quadratic polynomial. Results show that the piecewise regression performs better and realizes very accurate predictions, though the process optimization and inference becomes more complicated in theoretical terms.

Keywords: Piecewise Regression, Design of Experiments, Machining Process, Non-Linear Regression