

## Measuring process capability index $C_{pk}$ with fuzzy data

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### Abstract

Process capability index  $C_{pk}$  is important in manufacturing industry. This paper extends its applications to calculate the process capability index  $\tilde{C}_{pk}$  of fuzzy numbers. Unlike previous researches, the  $\alpha$ -cuts of fuzzy observations are first derived based on various values of  $\alpha$ . The membership function of fuzzy process capability index  $\tilde{C}_{pk}$  is then constructed based on the  $\alpha$ -cuts of fuzzy observations. Two examples are used to illustrate how to interpret the fuzzy process capability index  $\tilde{C}_{pk}$ . When the quality characteristic can not be precisely determined, the proposed method not only provides the most possible value and spread of fuzzy process capability index  $\tilde{C}_{pk}$ , but also can be easily applied to the fuzzy number with different types of membership functions. With crisp data, the proposed method reduces to the classical method of process capability index  $C_{pk}$ .

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