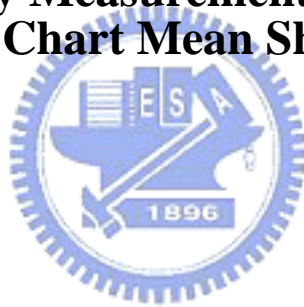# 國立交通大學

工業工程與管理學系

碩士論文

考慮韋伯製程平均發生偏移下之製程能力評估方法

Process Capability Measurement for Weibull Processes with Control Chart Mean Shift Consideration

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摘要

　　製程能力指標是用來衡量製程所製造之產品是否符合規格的能力，並且作為提供商品品質保證的工具。自從 1980 年代，Motorola 公司提出 6 個標準差的觀念後，許多統計學家質疑提倡 6 個標準差的品質工程師，為何在衡量製程能力時，需先對製程平均做 1.5 倍標準差偏移量的調整。Bothe 學者(2002)針對此問題，利用管制圖的監控機制來偵測製程平均發生偏移的情況，發現隨著不同的抽樣個數可以有不同的調整量，以達到管制圖有 50%的偵測率。但 Bothe 的研究是在製程資料服從常態分配的假設下，實務上，非常態分配的製程在業界是較常發生的，且常態製程之假設敏感地影響偏移量之調整。因此本論文針對三種非常態分配(韋伯、beta、F 分配)的製程，求得製程平均之調整量，並利用非常態製程所適用的 C_{pk} 指標做計算上之調整。最後以實例來說明如何在非常態製程中，且考慮製程平均會發生變動的情況下，來調整製程能力指標 C_{pk} 之計算。

關鍵字：製程能力指標、非常態、韋伯分配、beta 分配、F 分配、製程偏移

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Abstract

The process capability indices have been proposed to assess the ability of a process to meet preset specification limits and provide quality assurance. The process capability index C_{pk} has been one of the most popular index used in the manufacturing industry dealing with problem of measuring reproduction capability of process to enhance product development with very low fraction of defectives(in Parts Per million; PPM). Motorola, Inc. introduced its Six Sigma quality initiative to the world in the 1980s. Some quality practitioners questioned why the Six Sigma advocates claim it is necessary to add a 1.5σ shift to the average when estimating process capability. Bothe (2002) provides a statistical reason for including such a shift in the process average that is based on the chart's subgroup size. Data in Bothe' study was assumed to be approximately normally distributed. What affects on process capability estimates when the process output is not from approximate normally distribute. This paper calculate the mean shift adjustments and addresses this problem computing reliable estimates for capability index C_{pk} for non-normal (Weibull、beta and F distribution) process when the statistically adjustments is considered. For illustration purpose, an application example is presented.

Keywords: process capability index, non-normal, Weibull distribution, beta distribution, F distribution, mean shift