影像處理:以拉普拉辛-高辛罩幕及零交越點偵測自動檢測機械工作之同心度

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中文摘要

隨著高品質及產品少量多樣化之市場需求,生產結構產生了極大改變,彈性製造系統、電腦整合製造等之自動化技術因應而生。在自動化製造中,由於工具機優劣、操作人員素質、及製造技術等因素,造成產品品質不穩定。且傳統人工量測或離線(off-line)之接觸式檢驗方式又造成生產力降低。因此,非接觸式之線上(on-line)製程品管檢驗乃成為非常重要之研究課題。本研究提出以個人電腦及影像處理設備所建立之非接觸式自動檢測系統,針對機械工作(mechanical part)之同心度(concentricity)檢測問題進行研究。我們應用拉普拉辛-高辛罩幕 (Laplacian-Gaussian mask;LOG),及零交點偵測(Zero-crossing detection) 完成影像邊緣偵測(edge detection),再以曲線擬合(curve fitting)分離出屬於機械工作內圓與外圓的邊緣點(edge)。由這些內圓及外圓之邊緣點位置座標資料,應用簡單之圓心、半徑估測法,分別計算其圓心座標,而兩圓心之距離誤差量,即為待測工作之同心度。

Abstract

The variations in quality of machine, members and manufacturing skills willcauses the unstability of product quality in automatic manufacturint. The tarditional inspection by members or off-line inspection by contact further reduce the productivity,therefore,the noncontact procedure of on-line quality control becomes very important. In this study, to inspect the concetricity of mechanical parts, a noncontactable self-inspect'ng system is established by PC and image processing techniques. All we have to do is to put it on the specified position. This system will be startedto sample the image.analyze, calculate and show the automatic inspection of concentricity according to the programs. We used the Laplacian-Gaussian mask to convolove with digitized gray levelobtained by computer image processing system, then trarnsforming the ouput of LOGinto binary image by zero-crossing detection, and separated the edge-coordinages of theinner and outer circles of the mechanical part. Finally,using the coordinates of edge to calculate the inner and outer circular centers separately, the difference between thetwo circlular center is outcined, which is the desired concentricity.