

國立勤益科技大學講座推薦表

申請日期：112 年 3 月 27 日

推薦單位 (校長推薦由秘書室辦理)	管理學院	推薦層級	■院
被推薦(自薦)人 姓名	陳坤盛	教授證號	教字第 009984 號
專長領域	生產大數據分析、製程能力指標、六標準差方法與應用及服務管理等	教授年資 起算日	88 年 2 月 1 日
現職	國立勤益科技大學講座教授		
推薦講座種類	■專任講座	校長推薦時 擬設置單位	
資格條件(本校講座設置辦法第 3 條第 1 項所列 8 款, 請勾選其中之一): ■八、在學術上或專業領域上有傑出貢獻或聲望卓著者。			
檢附資料: 二、符合上述資格條件第三款至第八款其中之一者, 除上述資料外, 請依所推薦講座之種類, 檢附下列資料, 由推薦單位會辦研究發展處認定, 其認定基準見附註。 (一)■專任講座: 下列各款擇一提列並勾選 1. ■前一年度以本校名義為第一作者或通訊作者發表 SCI 等級論文 12 篇以上(其中名列第 1 作者篇數應達 6 篇以上)。			
履行義務具體說明 (依講座設置辦法第 8 條規定, 續聘時填列, 新推薦者免填)			
一、聘任期間: 111 年 8 月 1 日至 112 年 7 月 31 日, 每學年至少一次校內演講, 聘期內共辦理 ___1___ 次, 辦理日期如下: 112 年 4 月 1 日 主題: 統計機率分配的學術應用			
申請推薦人簽名:  (※由推薦單位主動推薦者, 免填)			
推薦單位主管		研究發展處	
經查被推薦人具講座設置辦法第 3 條所定積極資格且未具同條所定消極資格, 被推薦案件審理期間如經檢舉查證有消極資格情事屬實願撤回推薦, 絕無異議。		☒ 本案依講座設置辦法第 3 條之積極資格條件認定符合。 ☐ 本案認定不符合。原因: _____	
 (由系所推薦時, 仍請送所屬學院院長核章)		  	

人事室		校長核示			
本案屬講座設置辦法第3條第1項第1款至第3款其中之一，奉核後聘任，並於校教評會列入工作報告備查。 ☒ 本案屬講座設置辦法第3條第1項第4款至第8款其中之一。		☐ 屬講座設置辦法第3條第1項第1款至第3款其中之一，逕行聘任，並送校教評會備查。 ☒ 屬講座設置辦法第3條第1項第4款至第8款其中之一，提相關會議審議。 2023.04.10			
系教評會 (院、校級推薦，免填)		年 月 日 學年度 學期 次教評會審議通過 (附會議紀錄)。 召集人核章：			
學院教評會 (校級推薦，免填)		年 月 日 學年度 學期 次教評會審議通過 (附會議紀錄)。 召集人核章：			
校教評會		年 月 日 學年度 學期 次教評會審議通過 (附會議紀錄)。 召集人核章：			
校長核定聘任					



申請績效內容表列(請檢附佐證)

一、SCI 期刊(若欄位不足，請自行增加)

編號	作者屬性	合著者依序詳列所有作者(通訊請以*1、*2 加註)	發表年/月	論文名稱	期刊名稱	卷數 vol	期數 no	頁碼	論文屬性	研發處核符 註記	備註
1	通訊作者	Chiou, K. C., and <u>Kuen-Suan Chen*(陳坤盛)</u>	2022 年 1 月	Lifetime performance evaluation model based on quick response thinking	Eksploatacja i Niezawodność – Maintenance and Reliability	24	1	1-6	■SCIE	核 符	181
2	通訊作者	Chang, T. C., and <u>Kuen-Suan Chen*(陳坤盛)</u>	2022 年 1 月	Statistical test of two Taguchi Six-Sigma quality indices to select the supplier with optimal processing quality	Journal of Testing and Evaluation	50	1	674-688	■SCIE	核 符	182
3	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , and Yu, C. M.*	2022 年 2 月	Fuzzy decision-making model for process quality improvement of machine tool industry chain	Journal of Intelligent & Fuzzy Systems	42	3	1547-1558	■SCIE	核 符	183
4	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Yu, C. M., and Huang, M. L.*	2022 年 2 月	Fuzzy selection model for quality-based IC packaging process outsourcers	IEEE Transactions on Semiconductor Manufacturing	35	1	102-109	■SCIE	核 符	184
5	第一作者	<u>Kuen-Suan Chen*(陳坤盛)</u>	2022 年 4 月	Fuzzy testing of operating performance index based on confidence intervals	Annals of Operations Research	31 1	1	19-33	■SCIE	核 符	186

6	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , and Yu, C. M.*	2022 年 4 月	Lifetime performance evaluation and analysis model of passive component capacitor products	Annals of Operations Research	31 1	1	51-64	■SCIE	核 符	187
7	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , and Hsieh, T. H.*	2022 年 5 月	Novel physical fitness fuzzy evaluation model for Individual Health Promotion	International Journal of Environmental Research and Public Health	19	9	5060	■SCIE	核 符	189
8	通訊作者	Chen, T., Hsu, T. H., <u>Kuen-Suan Chen*(陳坤盛)</u> , and Yang, C. M.	2022 年 5 月	A fuzzy improvement testing model of bank APP performance	Mathematics	10	9	1409	■SCIE	核 符	190
9	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , and Chang, T. C.*	2022 年 5 月	Fuzzy testing model for the lifetime performance of products under consideration with exponential distribution	Annals of Operations Research	31 2	1	87-98	■SCIE	核 符	192
10	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Hsu, C. H.*, and Chiou, K. C.	2022 年 6 月	Product quality evaluation by confidence intervals of process yield index	Scientific Reports	12	范孟育	10508	■SCIE	核 符	193
11	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Huang, M. C., Yu, C. M.*, Chen, H. Y.	2022 年 7 月	Quality-Based Supplier Selection Model for Products with Multiple Quality Characteristics	Sustainability	14	范孟育	8532	■SCIE	核 符	194

12	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Liu, C. C., and Chen, C. H.*	2022 年 7 月	Fuzzy Evaluation of Process Quality with Process Yield Index	Mathematics	10	14	2514	■SCIE	核 符	195
13	通訊作者	Yang, C. M., Huang, T. H., <u>Kuen-Suan Chen*¹(陳坤盛)</u> , Chen, C. H.* ² , Li, S.	2022 年 8 月	Fuzzy quality evaluation and analysis model for improving the quality of unleaded gasoline to reduce air pollution	Mathematics	10	15	2789	■SCIE	核 符	196
14	通訊作者	Tseng, C. C., Chiou, K. C., and <u>Kuen-Suan Chen*(陳坤盛)</u>	2022 年 10 月	Estimation of the Six Sigma quality index	Mathematics	10	19	3458	■SCIE	核 符	198
15	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Huang, T. H., Tsaur, R. C.* and Kao, W. Y.	2022 年 11 月	Fuzzy Evaluation Models for Accuracy and Precision Indices	Mathematics	10	21	3961	■SCIE	核 符	200
16	第一作者	<u>Kuen-Suan Chen(陳坤盛)</u> , Li, F. C., Lai, K. K.*, and Lin, J. M.	2022 年 12 月	Green Outsourcer Selection Model Based on Confidence Interval of PCI for SMT Process	Sustainability	14	24	16667	■SCIE	核 符	201

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專題 講座

統計機率分配的學術應用

◆ 主講人：

國立勤益科技大學 陳坤盛教授

◆ 時間：2023年04月01日

◆ 地點：管理館M115教室



181

Lifetime performance evaluation model based on quick response thinking

作者: Chiou, KC (Chiou, Kuo-Ching) [1] Chen, KS (Chen, Kuen-Suan) [2], [3], [4]

EKSPLATACJA I NIEZAWODNOSC-MAINTENANCE AND RELIABILITY

卷冊: 24 期: 1 頁面: 1-6

DOI: 10.17531/ein.2022.1.1

出版時間: 2022

已建立索引: 2021-12-04

文獻類型: Article

摘要

In practice, lifetime performance index CL has been a method commonly applied to the evaluation of quality performance. L is the upper or lower limit of the specification. The product lifetime distribution is mostly abnormal distribution. This study explored that the lifetime of commodities comes from exponential distribution. Complete data collection is the primary goal of analysis. However, the censoring type is one of the most commonly used methods due to considerations of manpower and material cost or the timeliness of product launch. This study adopted Type-II right censoring to find out the uniformly minimum variance unbiased (UMVU) estimator of the lifetime performance index CL and its probability density function. Afterward this study obtained the $100(1-\alpha)\%$ confidence interval of the lifetime performance index CL as well as created the uniformly most powerful (UMP) test and the power of the test for the product lifetime performance index. Last, this study came up with a numerical example to demonstrate the suggested method as well as the application of the model.

☐ 1 Lifetime performance evaluation model based on quick response thinking



Chiou, KC and Chen, KS

2022 | EKSPLATACJA I NIEZAWODNOSC-MAINTENANCE AND RELIABILITY 24 (1), pp.1-6

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期刊 Impact Factor™

2021

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ENGINEERING,
MULTIDISCIPLINARY
於 SCIE 版本

40/92

Q2

來源: Journal Citation Reports™ 2021

182

Statistical Test of Two Taguchi Six-Sigma Quality Indices to Select the Supplier with Optimal Processing Quality

作者: Chang, TC (Chang, Tsang-Chuan) ^[1] Chen, KS (Chen, Kuen-Suan) ^[2], ^[3]

JOURNAL OF TESTING AND EVALUATION

卷冊: 50 期: 1 頁面: 674-688

DOI: 10.1520/JTE20210016

出版時間: JAN 2022

已建立索引: 2022-02-06

文獻類型: Article

摘要

Because of rapid changes in consumer needs, diverse and small-batch production has become a crucial strategy for companies progressing toward sustainability in intensely competitive industries. To swiftly meet the diverse needs of consumers using this production strategy, often manufacturers must outsource noncore processes to external contractors or purchase component parts from suppliers. The objective of this article was to develop a supplier selection model based on the processing quality of suppliers. Owing to the fact that the Taguchi SixSigma quality index for process with nominal-the-best specification (Qpm) can fully reflect product loss and the achieved quality level for the quality characteristic of the process in question, Qpm is employed as a tool to assess and compare the processing quality level of two-sided specification limits provided by each supplier. In practice, Qpm is based on the sample data collected from a stable process to estimate prior to the processing quality assessment. This can lead to misjudgment because of sampling error. To increase the reliability of supplier selection, we further propose hypothesis testing of the quality index Qpm for two suppliers. The applicability and effectiveness of the proposed model is validated using an example involving the double-sided grinding process of a bicycle disc brake.

1 Statistical Test of Two Taguchi Six-Sigma Quality Indices to Select the Supplier with Optimal Processing Quality

Chang, TC and Chen, KS

Jan 2022 | JOURNAL OF TESTING AND EVALUATION 50 (1), pp.674-688

JOURNAL OF TESTING AND EVALUATION

期刊 Impact Factor™

2021

五年

1.333

1.267

顯示筆數

JCR 領域

領域排名

領域四分位

MATERIALS SCIENCE,
CHARACTERIZATION &
TESTING

23/32

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來源: Journal Citation Reports™ 2021

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183

Fuzzy decision-making model for process quality improvement of machine tool industry chain

作者: Chen, KS (Chen, Kuen-Suan) [1], [2], [3]; Yu, CM (Yu, Chun-Min) [1]

JOURNAL OF INTELLIGENT & FUZZY SYSTEMS

卷冊: 42 期: 3 頁面: 1547-1558

DOI: 10.3233/JIFS-210868

出版時間: 2022

已建立索引: 2022-02-17

文獻類型: Article

摘要

Industry 4.0 has fostered innovation in industries around the world. Manufacturing industries in particular are advancing towards smart manufacturing by integrating and applying relevant technologies. The output value of machine tools in Taiwan is among the top of the world and the central region is a key area for this industry chain, which supplies manufacturers in Taiwan and their international downstream customers. To support innovation in this industry, the current study used the Six Sigma quality indices for smaller-the-better, larger-the-better, and nominal-the-best quality characteristics to construct a fuzzy decision-making model. Based on this model, we propose a process quality fuzzy analysis chart (PQFAC) for process quality improvement. Our use of fuzzy decision values to replace lower confidence limits decreases the probability of misjudgment made by sampling errors. The proposed fuzzy model also offers a more accurate assessment of process improvement requirements. We provide a real-world example to demonstrate the applicability of the proposed approach. Machine tool manufacturers can apply the platform and proposed model to evaluate their process capabilities for the vital parts suppliers and downstream customers, determine optimal machine parameter settings for processes with inadequate accuracy or precision, establish more suitable machine repair and maintenance systems, and combine the improvement experiences of customers to create an improvement knowledge base. This will enhance product value and industry competitiveness for the entire machine tool industry chain.

1 Fuzzy decision-making model for process quality improvement of machine tool industry chain

Chen, KS and Yu, CM

2022 | JOURNAL OF INTELLIGENT & FUZZY SYSTEMS 42 (3), pp.1547-1558

JOURNAL OF INTELLIGENT & FUZZY SYSTEMS

期刊 Impact Factor™

2021	五年
1.737	1.664

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	COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE 於 SCIE 版本	112/144	Q4
	來源: Journal Citation Reports™ 2021		

industries in particular are
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key area fr ... 顯示更多

184

Fuzzy Selection Model for Quality-Based IC Packaging Process Outsourcers

作者: Chen, KS (Chen, K. S.) [1]; Yu, CM (Yu, C. M.) [1]; Huang, ML (Huang, M. L.) [1]

檢視 Web of Science ResearcherID 和 ORCID (Clarivate 提供)

IEEE TRANSACTIONS ON SEMICONDUCTOR MANUFACTURING

卷冊: 35 期: 1 頁面: 102-109

DOI: 10.1109/TSM.2021.3125991

出版時間: FEB 2022

已建立索引: 2022-02-26

文獻類型: Article

跳至

被引參考文獻深度分析

摘要

The annual output value of Taiwan's wafer foundry and IC packaging test ranks first worldwide. The electronics industry has a complete industrial ecological chain in the supply chain system of global information and communication technology. In order to increase market competitiveness and increase the operational flexibility, manufacturing process outsourcing has become a trend in the business model of the electronics industry. The quality of the outsourcing affects the quality and function of the final product, the outsourcer selection is crucial to ensure the quality of the final product. This article takes the wire bonding process as an example, and proposes a fuzzy selection model of quality-based IC packaging process outsourcers. Then, this article selects the six standard deviation indicator that can fully reflect the process yield and quality level as the evaluation tool. Since the indicator contains unknown parameter, in order to improve the accuracy of estimation and overcome the uncertainty of measurement data, this paper applies mathematical programming to derive the confidence

1 Fuzzy Selection Model for Quality-Based IC Packaging Process Outsourcers

Chen, KS; Yu, CM and Huang, ML

Feb 2022 | IEEE TRANSACTIONS ON SEMICONDUCTOR MANUFACTURING 35 (1) , pp.102-109

IEEE TRANSACTIONS ON SEMICONDUCTOR MANUFACTURING

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JCR 領域

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ENGINEERING, ELECTRICAL &
ELECTRONIC

130/276

Q2

於 SCIE 版本

ENGINEERING, MANUFACTURING

31/51

Q3

於 SCIE 版本

PHYSICS, APPLIED

79/161

Q2

於 SCIE 版本

PHYSICS, CONDENSED MATTER

39/69

Q3

於 SCIE 版本

來源: Journal Citation Reports™ 2021

Fuzzy testing of operating performance index based on confidence intervals

作者: Chen, KS (Chen, Kuen-Suan) [1], [2]

ANNALS OF OPERATIONS RESEARCH

卷冊: 311 期: 1 頁面: 19-33 特刊: SI

DOI: 10.1007/s10479-019-03242-x

出版時間: APR 2022

已建立索引: 2022-03-24

文獻類型: Article; Proceedings Paper

研討會

會議: Asia-Pacific International Symposium on Advanced Reliability and Maintenance Modeling (APARM)

位置: Qingdao, PEOPLES R CHINA

日期: AUG 21-24, 2018

摘要

The operating performance index (OPI) was developed by Chen and Yang (J Comput Appl Math 343:737-747, 2018) from the Six Sigma process quality index. The fact that OPIs include unknown parameters means that they must be formulated using estimates based on sample data. Unfortunately, cost and effectiveness considerations in practice have led to sample size limitation and measurement uncertainty. In this study, we sought to enhance testing accuracy and overcome the uncertainties in measurement by applying confidence intervals of OPI to derive a fuzzy number and membership function for OPI. We developed a one-tailed fuzzy test method to determine whether performance reaches the required level. We also developed a two-tailed fuzzy testing method based on two OPIs to serve as a verification model for the effectiveness of improvement measures. Both fuzzy testing methods are proposed based on confidence intervals of the indices to reduce the

1 Fuzzy testing of operating performance index based on confidence intervals

Chen, KS

Asia-Pacific International Symposium on Advanced Reliability and Maintenance Modeling (APARM)

Apr 2022 | ANNALS OF OPERATIONS RESEARCH 311 (1), pp.19-33

ANNALS OF OPERATIONS RESEARCH

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2021	五年
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OPERATIONS RESEARCH &
MANAGEMENT SCIENCE
於 SCIE 版本

22/87

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Sigma process quality index.
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來源: Journal Citation Reports™ 2021

187

Lifetime performance evaluation and analysis model of passive component capacitor products

作者: Chen, KS (Chen, Kuen-Suan) [1], [2], [3]; Yu, CM (Yu, Chun-Min) [1]

檢視 Web of Science ResearcherID 和 ORCID (Clarivate 提供)

ANNALS OF OPERATIONS RESEARCH

卷冊: 311 期: 1 頁面: 51-64 特刊: SI

DOI: 10.1007/s10479-021-04242-6

出版時間: APR 2022

早期取閱: SEP 2021

已建立索引: 2021-09-29

文獻類型: Article

摘要

With the rise of the semiconductor industry, passive components have become a foundation of the electronics industry and propelled the development of peripheral equipment and industries. This paper focused on improving the lifetime performance of products to increase product value and achieve the green production goals of energy conservation and waste reduction. We first established a relative lifetime performance index for passive component capacitors. Next, we derived the cumulative distribution function and reliability function based on the probability density function of relative lifetime to investigate the properties of the relative lifetime performance index. The results indicated that the reliability increased with the index value and that the probability of the product lifetime exceeding the minimum requirement also increased with the index value. Due to the fact that the index contains unknown parameters, using point estimates to

1 Lifetime performance evaluation and analysis model of passive component capacitor products



Chen, KS and Yu, CM

Apr 2022 | Sep 2021 (早期取閱) | ANNALS OF OPERATIONS RESEARCH 311 (1), pp.51-64

ANNALS OF OPERATIONS RESEARCH



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1 prod ... 顯示更多

期刊 Impact Factor™

2021	五年
4.82	4.46

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JCR 領域	領域排名	領域四分位
OPERATIONS RESEARCH & MANAGEMENT SCIENCE 於 SCIE 版本	22/87	Q2

在您選取的頁

來源: Journal Citation Reports™ 2021

189

Novel Physical Fitness Fuzzy Evaluation Model for Individual Health Promotion

作者: Chen, KS (Chen, Kuen-Suan) [1], [2], [3]; Hsieh, TH (Hsieh, Tzung-Hua) [4]

INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH

卷冊: 19 期: 9

文獻號碼: 5060

DOI: 10.3390/ijerph19095060

出版時間: MAY 2022

已建立索引: 2022-06-05

文獻類型: Article

跳至

被引參考文獻深度分析

摘要

Physical fitness level plays a significant role in health promotion. Cardiorespiratory endurance, muscular endurance, muscle power, and flexibility are the four key indicators of physical fitness level, listed as one of the important fields of preventive medicine. Some studies

1 Novel Physical Fitness Fuzzy Evaluation Model for Individual Health Promotic



Chen, KS and Hsieh, TH

May 2022 | INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH 19 (9)

INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH

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期刊 Impact Factor™

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JCR 領域

領域排名

領域四分位

ENVIRONMENTAL SCIENCES
於 SCIE 版本

100/279

Q2

PUBLIC, ENVIRONMENTAL &
OCCUPATIONAL HEALTH
於 SCIE 版本

71/210

Q2

PUBLIC, ENVIRONMENTAL &
OCCUPATIONAL HEALTH
於 SSCI 版本

45/182

Q1

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來源 : Journal Citation Reports™ 2021

A Fuzzy Improvement Testing Model of Bank APP Performance

作者: Chen, T (Chen, Tian) ^{[1], [2]}; Hsu, TH (Hsu, Ting-Hsin) ^[3]; Chen, KS (Chen, Kuen-Suan) ^{[4], [5], [6]}; Yang, CM (Yang, Chun-Ming) ^[1]

MATHEMATICS

卷冊: 10 期: 9

文獻號碼: 1409

DOI: 10.3390/math10091409

出版時間: MAY 2022

已建立索引: 2022-05-23

文獻類型: Article

跳至

三. 被引參考文獻深度分析

摘要

Numerous studies have pointed out that the issue of global warming is getting increasingly more serious. Therefore, the concepts of circular economy (CE) and sharing economy have been more and more valued by enterprises and governments. With the gradual popularization and maturity of the Internet of Things (IoT), various smart APP platforms have sprung up rapidly. For example, the fuzzy evaluation model of bank APP performance was proposed in such an environment, aiming to improve the APP service performance by means of evaluating, analyzing,

摘要

Numerous studies have pointed out that the issue of global warming is getting increasingly more serious. Therefore, the concepts of circular economy (CE) and sharing economy have been more and more valued by enterprises and governments. With the gradual popularization and maturity of the Internet of Things (IoT), various smart APP platforms have sprung up rapidly. For example, the fuzzy evaluation model of bank APP performance was proposed in such an environment, aiming to improve the APP service performance by means of evaluating, analyzing, improving, and enhancing customers' satisfaction with their use of APPs, and increasing the number of users of APPs. Since the follow-up of the article did not mention the improved testing model used to verify the improvement effect, this paper then proposed a fuzzy two-tailed testing model with two indices before and after the improvement based on the confidence interval to verify whether the improvement has had a significant effect. This complete bank APP fuzzy performance evaluation, analysis, and improvement model measured the bank APP operation performance using customer time intervals, so the data collection time was short. Not only can it meet enterprises' need for rapid response and grasp the opportunity for improvement to achieve the effect of energy-saving and carbon reduction, but it also can satisfy enterprises' requirement to pursue fast and accurate decision-making. Furthermore, the fuzzy two-tailed test proposed by this paper was based on the confidence interval, which can reduce the risk of misjudgment caused by sampling error. Plenty of studies have indicated that the designs based on confidence intervals can integrate expert experience and past data so that the accuracy of testing can be maintained in the case of small-sized samples.

關鍵字

作者關鍵字: thinking of sharing economy; bank APP; APP performance index; confidence interval; fuzzy two-tailed testing model

Keywords Plus: SUPPLIER SELECTION

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192

Fuzzy testing model for the lifetime performance of products under consideration with exponential distribution

作者: Chen, KS (Chen, Kuen-Suan) ^{[1], [2]}; Chang, TC (Chang, Tsang-Chuan) ^[3]

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摘要

With intense competition in industry today, product quality has become a crucial factor influencing whether a firm can achieve sustainable operations and maintain competitiveness. Process capability indices are effective tools often used in manufacturing to determine whether products meets requirements, and most assume that the quality characteristics of products follow normal distributions. However, not all quality characteristics necessarily follow normal distributions; for example, product lifetime, a time-oriented quality characteristic, generally follows an exponential distribution or other associated non-normal distributions. The lifetime performance index C-L was thus developed to gauge the lifetime performance of products, and most related studies use the precise values of time data to evaluate product lifetime.

- ☐ 1 Fuzzy testing model for the lifetime performance of products under consideration with exponential distribution



Chen, KS and Chang, TC

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193

Product quality evaluation by confidence intervals of process yield index

作者: Chen, KS (Chen, Kuen-Suan) [1], [2], [3]; Hsu, CH (Hsu, Chang-Hsien) [4]; Chiou, KC (Chiou, Kuo-Ching) [5]

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摘要

Statistical techniques have a beneficial effect on measuring process variability, analyzing the variability concerning product requirements, and eliminating the variability in product manufacturing. Process capability indices (PCIs) are not only easy to understand but also able to be directly employed by the manufacturing industry. The process yield index offers accurate measurement of the process yield, and it is a function of two unilateral six sigma quality indices. This paper initiates to develop the confidence intervals of the process yield index by using joint confidence regions of two unilateral six sigma quality indices for all quality characteristics of a product. Then integrate these joint confidence regions to find the confidence intervals of the product yield index. All manufacturing industries can use these confidence intervals to make statistical inferences to assess whether the process capability of the product and all quality characteristics has reached the required level, and to grasp the opportunities for improvement. An illustrated example on driver integrated circuit of micro hard disk is provided.

1 Product quality evaluation by confidence intervals of process yield index

Chen, KS; Hsu, CH and Chiou, KC
Jun 22 2022 | SCIENTIFIC REPORTS 12 (1)

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Quality-Based Supplier Selection Model for Products with Multiple Quality Characteristics

作者: Chen, KS (Chen, Kuen-Suan) [1], [2], [3]; Huang, MC (Huang, Ming-Chieh) [4]; Yu, CM (Yu, Chun-Min) [1]; Chen, HY (Chen, Hsuan-Yu) [5]

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摘要

The concept of Industry 4.0 was first proposed by the German government in 2011. As the Internet of Things (IoT) becomes more prevalent and big data analysis technology becomes more mature, it is beneficial for the manufacturing industry to integrate and apply the related technologies to pursue the goal of smart manufacturing. Taiwan's machine tool industry and downstream machine-tool purchasers, who are scattered around the world, have formed a machine-tool industry chain. To help the machine-tool industry and the suppliers of important components boost their process capabilities, ensure the final product quality of machine tools and improve the process capabilities of the entire industry chain, this study used radar charts to present the statistical testing information of the process capabilities of all quality characteristics, so that managers could have more complete information when evaluating and selecting appropriate suppliers. As noted in many studies, improving product quality and availability can reduce

SUSTAINABILITY

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Fuzzy Evaluation of Process Quality with Process Yield Index

作者 Chen, KS (Chen, Kuen-Suan) ^[1]; Liu, CC (Liu, Chin-Chia) ^[2]; Chen, CH (Chen, Chi-Han) ^[2]

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摘要

With the rapid development and evolution of the Internet-of-Things (IoT) and big data analysis technologies, faster and more accurate production data analysis and process capability evaluation models will bring industries closer to the goal of smart manufacturing. Small sample sizes are also common, due to destructive testing, the high costs of detection, and insufficient technological capacity, and these undermine the reliability of the statistical method. Many studies have pointed out that a confidence interval-based fuzzy decision model can incorporate accumulated data and expert experiences to increase testing accuracy for small samples. Therefore, this study came up with a confidence interval-based fuzzy decision model based on a process yield index. The index not only reflects process capability but also has a one-to-one mathematical relation with the process yield so that it is convenient to apply in practice. The proposed model not only diminishes the probability of misjudgment resulting from sampling error but also improves the accuracy of process capability evaluation of small sample sizes. The results show that the proposed model is effective and reliable.

Fuzzy Quality Evaluation and Analysis Model for Improving the Quality of Unleaded Gasoline to Reduce Air Pollution

作者: Yang, CM (Yang, Chun-Ming) ^[1]; Huang, TH (Huang, Tsun-Hung) ^[2]; Chen, KS (Chen, Kuen-Suan) ^[2], ^[3], ^[4]; Chen, CH (Chen, Chi-Han) ^[5]; Li, SY (Li, Shiyao) ^[1], ^[6]

MATHEMATICS

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摘要

It is important to estimate the sample data when inspecting the quality of products. Therefore, sampling error and uncertainty in the measurement are inevitable, which may lead to misjudgment in product performance evaluation. Since the important quality characteristics of gasoline belong to one-sided specifications, a one-sided specification capability index was proposed to evaluate whether the process capabilities of various quality characteristics of gasoline reach the required quality levels. The 100(1- α)% upper confidence limits of the index were obtained to ensure low producer's risk and reduce sampling errors. To deal with fuzzy data and limited sample sizes, a fuzzy testing model based on the 100(1- α)% upper confidence limits of the index was developed. A practice example of 95 unleaded gasoline was used to illustrate the effectiveness and usefulness of the proposed method. The result shows that two quality characteristics-Reid vapor pressure and oxygen content of the nine quality characteristics of the 95 unleaded gasoline should be considered for improvements. This study provided an evaluation procedure to facilitate quality managers to take the opportunity to improve product quality, promoting the improvement of air quality, and the sustainability of industrial processes or products.

關鍵字

作者關鍵字: product quality; unleaded gasoline; confidence interval; fuzzy evaluation model; air pollution

Keywords Plus: PROCESS CAPABILITY INDEX; SAMPLE SIZE; DESIGN; SYSTEM

作者資訊

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Science Citation Index Expanded (SCIE)

CATEGORY

MATHEMATICS

21/333

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE	
2021	21/333	Q1	93.84	
2020	24/330	Q1	92.88	
2019	28/325	Q1	91.54	
2018	75/314	Q1	76.27	

Estimation of the Six Sigma Quality Index

作者: Tseng, CC (Tseng, Chun-Chieh) [1]; Chiou, KC (Chiou, Kuo-Ching) [2]; Chen, KS (Chen, Kuen-Suan) [3], [4], [5]

MATHEMATICS

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摘要

The measurement of the process capability is a key part of quantitative quality control, and process capability indices are statistical measures of the process capability. Six Sigma level represents the maximum achievable process capability, and many enterprises have implemented Six Sigma improvement strategies. In recent years, many studies have investigated Six Sigma quality indices, including $Q(pk)$. However, $Q(pk)$ contains two unknown parameters, namely delta and gamma, which are difficult to use in process control. Therefore, whether a process quality reaches the k sigma level must be statistically inferred. Moreover, the statistical method of sampling distribution is challenging for the upper confidence limits of $Q(pk)$. We address these two difficulties in the present study and propose a methodology to solve them. Boole's inequality, Demorgan's theorem, and linear programming were integrated to derive the confidence intervals of $Q(pk)$, and then the upper confidence limits were used to perform hypothesis testing. This study involved a case study of the semiconductor assembly process in order to verify the feasibility of the proposed method.

關鍵字

作者關鍵字: Six Sigma quality index; linear programming; estimations; upper confidence limit; statistic hypothesis testing

Keywords Plus: PERFORMANCE

作者資訊

通訊地址: Chen, Kuen-Suan (通訊作者)

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2019	28/325	Q1	91.54
2018	75/314	Q1	76.27

200-11 月

Fuzzy Evaluation Models for Accuracy and Precision Indices

作者: Chen, KS (Chen, Kuen-Suan) ^{[1], [2], [3]}; Huang, TH (Huang, Tsun-Hung) ^[1]; Tsaur, RC (Tsaur, Ruey-Chyn) ^[4]; Kao, WY (Kao, Wen-Yang) ^[5]

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摘要

The random variable X is used to represent the normal process containing two important parameters-the process average and the process standard deviation. The variable is transformed using $Y = (X - T)/d$, where T is the target value and d is the tolerance. The average of Y is then called the accuracy index, and the standard deviation is called the precision index. If only the values of the accuracy index and the process precision index are well controlled, the process quality level as well as the process yield are ensured. Based on this concept, this paper constructed a control chart for the accuracy index and the precision index and derived the confidence intervals of the accuracy index and the precision index using in-control data, as the process was stable. This paper aims to control process quality via monitoring the accuracy and precision of the process. At the same time, fuzzy tests are developed for the indicators of process accuracy and precision to evaluate whether the process quality can reach the k -sigma quality level, as well as offer suggestions about directions of improvement when it fails to reach the k -sigma quality level. Obviously, the model in this paper cannot only evaluate whether the process meets the requirements of the quality level; it can also provide a decision regarding whether the process should be improved. It is very helpful for the enhancement of enterprises' process capabilities.

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2021	21/333	Q1	93.84	
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2019	28/325	Q1	91.54	
2018	75/314	Q1	76.27	

Green Outsourcer Selection Model Based on Confidence Interval of PCI for SMT Process

作者: Chen, KS (Chen, Kuen-Suan)^[1]; [2]; [3]; Li, FC (Li, Feng-Chia)^[4]; Lai, KK (Lai, Kuei-Kuei)^[3]; Lin, JM (Lin, Jung-Mao)^[1]

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摘要

Taiwan's electronics industry usually outsources most of its important components for production to enhance market competitiveness and operational flexibility. The quality of all component products is important to ensure the quality of the final product. In electronic assembly, printed circuit boards (PCBs) are key components that carry other electronic components to provide a stable circuit working environment. Surface Mounted Technology (SMT) is the mainstream technology in electronic assembly plants. Obviously, good SMT process quality is relatively important to the final product quality. The process capability index (PCI) is the most widely used process quality evaluation tool in the industry. Therefore, this paper used the PCI representing quality as the green outsourcer selection tool for the SMT process, derived the confidence interval of PCI to develop a quality evaluation model of green outsourcers, and considered the model as the green outsourcer selection model. Meanwhile, this model can be provided to enterprises, outsourcers, or suppliers to evaluate and improve the process quality of components to ensure the quality of components and final products. Since the selection model is based on confidence intervals, it can reduce the risk of misjudgment due to sampling error.

關鍵字

作者關鍵字: surface-mounted technology; process capability index; green outsourcer; confidence interval; pairwise comparison test

Keywords Plus: SUPPLIER SELECTION; QUALITY EVALUATION

作者資訊

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教授證書

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